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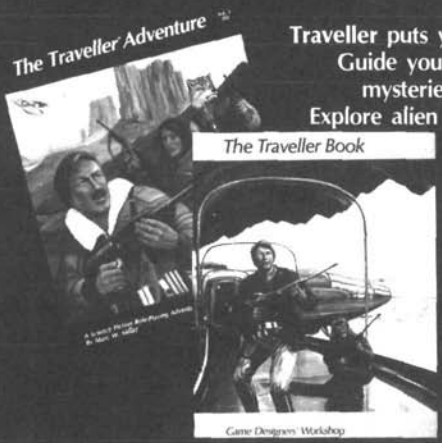

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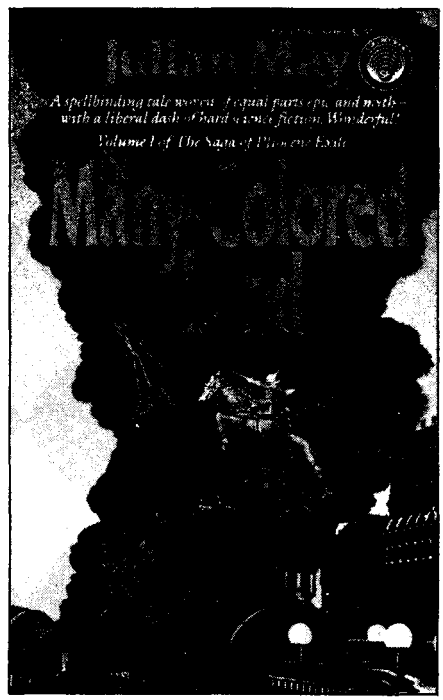

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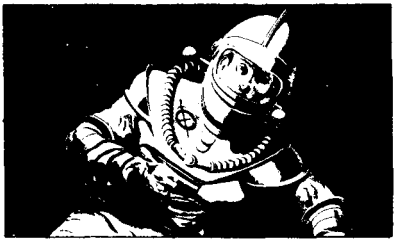

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Guest Editorial

WAR & PEACE IN THE SPACE AGE

Arthur C. Clarke

"We will take no frontiers into space." *Prelude to Space* (1951)

Distinguished Guests, Ladies and Gentlemen*—you may well wonder what a talk about the militarisation of space is doing in this first seminar arranged by our brand-new Institute of Fundamental Studies. To that, I can only answer that nothing is more *fundamental* than the prevention of nuclear war. If we fail in this, all else is irrelevant: science, politics, religion. . . .

Perhaps I should also explain how I got involved with space militarisation, and my qualifications for talking about a subject on which no one without a top-level security clearance can be a real

*Originally delivered as an address to the First Seminar of the Institute of Fundamental Studies, Colombo, December 11, 1982.

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authority. So a brief personal note may be in order.

I became a member of the British Interplanetary Society in 1934, and have been thinking about extraterrestrial activities for rather a long time. These, alas, include warfare; I have just recalled that, as a Royal Air Force trainee, I wrote the space-battle sequence in my novel *Earthlight* (1955) during a lull in the London Blitz, while the buildings around me were still smoking from the impact of primitive iron bombs. Hiroshima was still four years in the future—and Neil Armstrong was only eleven years old. . . .

Since then, either privately or in my capacity as Chairman of the British Interplanetary Society and of various space conferences, I have grown to know most of the leading figures in the field of astronautics. This June I had the privilege of being hosted at the Gagarin Cosmonaut Training Centre by my friend General Alexei Leonov and his colleagues. In August I was one of the Sri Lanka delegates to the Second United Nations Conference on the Peaceful Uses of Outer Space (Unispace '82); I had also attended the first one in 1968.

It soon became apparent at the 1982 Conference that though the subject of space militarisation was not on the official agenda—and indeed, its inclusion had been opposed by the chief space-faring powers—it was very much on the minds of all the delegates. In their opening addresses, both the Secretary-General of the United Nations and the Secretary General of the Conference, Dr. Yash Pal, referred to the urgent need to prevent a new arms race beyond the atmosphere. This theme was repeated by almost all the national representatives.

In addition, a sort of parallel conference of "N.G.O.s"—Non-Government Organisations—was taking place half a kilometre away, and discussion here was much less inhibited. Unofficial but often very well informed speakers — many of whom had come to Vienna at their own expense—expressed deeply felt views on space militarisation. The fact that some of them had once made a living in this line of work made their testimony all the more impressive. As has been well said, the best game-keepers are ex-poachers. . . .

On my way back to Sri Lanka from Unispace '82, our ambassador in Geneva, His Excellency Tissa Jayakoddy, asked me to address the U.N. Committee on Disarmament, which I did on August 31. The speech I then gave was subsequently placed in the *Congressional Record* (September 21) by Representative George E. Brown of California (Democrat), who is one of the few congressmen to make a stand against the militarisation of space—with surprising courage, since it is the principal industry of his state. The speech I am giving now is an extension of my Geneva address and contains much material which I have since acquired.

The subject of space warfare graduated abruptly from science fiction to science fact in the summer of 1945, though not many people realised it at the time. The first long-range rocket—the German V.2—had made its appearance only a few months before; it is hard to realise that even while it was being

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tested, distinguished scientists such as Churchill's advisor Lord Cherwell dismissed the V.2 as a myth, refusing to believe in the existence of rockets with the incredible range of three hundred kilometres. But the V.2, with its warhead of one ton of chemical explosives, had no decisive influence on World War II. Its real implication was not apparent until the arrival of nuclear weapons.

Long before the War—indeed, well before the discovery of uranium fission in 1938—I had amused my friends in the British Interplanetary Society by coining an ominous prediction: "The release of atomic energy will make space-travel not only possible—but imperative." Unfortunately, the positive part of this saying has not come true. Nuclear propulsion for spacecraft has proved to be a very difficult problem, and in the United States work on the atomic rocket was abandoned more than a decade ago. So we will have to save our planet, before we can escape from it; we cannot place our trust in nuclear Noah's Arks.

My serious thinking on these matters began in the summer of 1945, when the *Royal Air Force Quarterly* offered an award for the best essay on "The Rocket and the Future of Warfare." The prize of forty pounds—quite a lot of money in those days—was my first major literary income, and it has been a strange experience reading that paper again after thirty-seven years.

I would like to quote the lines of Shelley with which this essay began:

Cease! Drain not to its dregs the urn
Of bitter prophecy.
The world is weary of the past,
Oh, might it die or rest at last!

Nevertheless, "bitter prophecy" is indeed what we are concerned with today. So first, I must request you—if you have not already done so—to read Jonathan Schell's book *The Fate of the Earth,* which is the most convincing account yet given of the realities of nuclear warfare. It should be required reading for every statesman.

And yet Carl Sagan has summed up the implications of this entire book in a single chilling sentence. In my address to the U.N. Disarmament Committee I quoted it from memory, and made an understandable mistake which only serves to emphasise the appalling—the literally unimaginable—nature of the problem. I quoted Sagan as stating that a full-scale nuclear exchange would be the equivalent of "World War II once a minute, for the length of a lazy summer afternoon."

My memory was at fault. The correct quotation is: "World War II *once a second* for the length of a lazy afternoon." I would like those madmen who talk glibly about "protracted nuclear warfare" to think their way slowly through that sentence.

At Unispace '82 there was some confusion as to just what is meant by the "militarisation of space." There are very few of man's artifacts which cannot be equally well used for peaceful or warlike purposes; what matters is the *intention*. It is impossible to define a class of devices and say that "These must not be developed, because they can be employed offensively."

Let me give an example: few things would seem more remote from military

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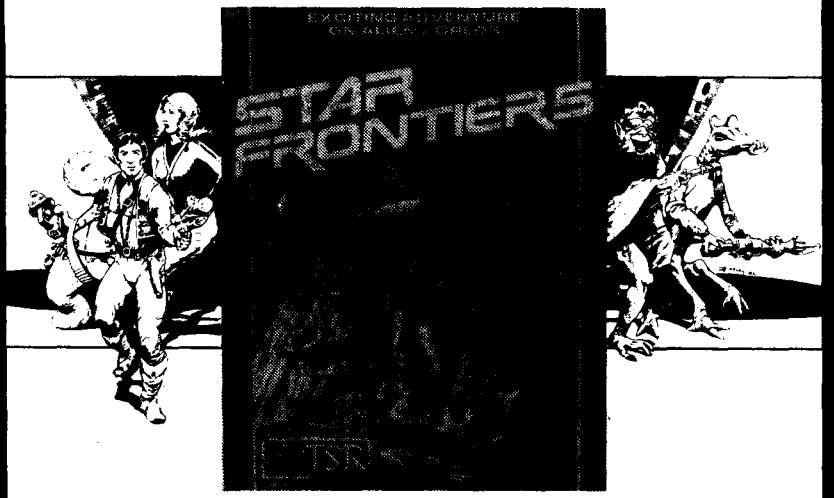

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affairs than the Geodetic Satellites used to detect minute irregularities in the earth's gravitational field. At first sight, this would seem to be of interest only to scientists; nevertheless, these subtle variations are of vital concern to the designers of intercontinental missiles, because unless the earth's gravitational field is accurately mapped, it is impossible to target a missile with precision. Thus purely scientific satellites, by greatly increasing the accuracy of warheads, can have a major impact on strategy. Yet does anyone suggest that they be prohibited?

Even meteorological satellites, one of the most benign of all applications of space technology, because they have already saved thousands of lives, are of obvious military importance—as was strikingly demonstrated in the recent South Atlantic War. Similarly, communications satellites play an absolutely vital role in military operations; yet neither represents a direct threat to peace.

Just as military helicopters can be used for disaster relief work, so some military space systems can be positively benign. Indeed, we might not be alive today without the stabilising influence of the reconnaissance satellites operated by both the U.S. and the U.S.S.R.

Let me remind you of a piece of recent history: In the early 1960s there was a vigorous campaign in the United States claiming that the U.S.S.R. was far in advance in the development of intercontinental ballistic missiles. The so-called "missile gap" was a major theme in the Kennedy-Nixon campaign: millions of words were written urging that the United States start a crash program to overcome the Soviet Union's "enormous" lead.

That missile gap was a total illusion—destroyed when American reconnaissance satellites revealed the true extent of Soviet rocket deployment. President Johnson later remarked that its reconnaissance satellites had saved the United States many times the cost of the space program, by making it unnecessary to build the counter-force originally intended. I would like to quote his exact words, which should be inscribed in letters of gold above the doors of the Pentagon:

"We were doing things we didn't need to do, we were building things we didn't need to build; *we were harboring fears we didn't need to harbor.*" (My italics.)

However, in a sense, that information may have come too late. One can picture the feelings of the Soviet military planners when contemplating this American debate. *They* knew they did not have the weapons the United States claimed, so what was the purpose of the exercise? Were the Americans deliberately creating an excuse to re-arm? That might have seemed the most plausible assumption—but in fact, ignorance rather than malice was the explanation. In any event, the Soviet Union decided it must produce the missiles which, at that time, existed only in the imagination of the Americans. So the seeds of a space arms race were planted, a quarter of a century ago.

It is possible to play a numbers game with payloads and launchings to prove almost anything. Statistics indicate that the Soviet Union has now launched

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about twice as many "military" payloads as the United States—by 1981, roughly 860 against 420, and the *numerical* disparity is increasing. Does this mean, as many in the West claim, that the Soviet Union has a more aggressive space programme than the United States? Not necessarily, because mere numbers can be very misleading.

Let me quote figures for the vital photographic reconnaissance satellites to clarify this point. In the four years between 1977 and 1981, the United States launched eleven. The Soviet Union launched the astonishing number of *175*.

However—the giant American "Big Birds" and KH-11 reconnaissance satellites have operating lifetimes of between half a year and several years; the Soviet satellites (all given the "Cosmos" designation) are designed to function for only two to four *weeks*. Each policy has obvious advantages; the Russian mass-production system clearly scores in cheapness and flexibility. I think we can assume that each side is adequately served.

There is one area, however, in which the Soviet Union is clearly ahead. Photographic or TV reconnaissance is limited by cloud conditions; only radar can give all-weather coverage. And only the U.S.S.R. has used radar satellites, *powered by nuclear reactors*, to reconnoitre the movements of ships at sea—as was embarrassingly revealed when Cosmos 954 crashed in Canada in 1978.

At this point it is relevant to mention the Landsat photographs, which have a ground resolution of roughly eighty metres, available to all nations. Not surprisingly, there has been some concern about the military information that these photographs inevitably contain. That concern will be increased now that

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Landsat D has started operations with a resolution of thirty metres; I was stunned by the beauty and definition of the first photographs when I saw them at Unispace. The French SPOT satellite will have even better resolution (ten-twenty metres) and this is rapidly approaching the area of military importance, although it is nowhere near (by a factor of almost one hundred!) the definition of the best reconnaissance satellites under favourable conditions.

There is a continuous spectrum between the abilities of the earth resources satellites and the reconnaissance satellites, and it is impossible to say that one is military and the other is not. What matters is, again, intention.

One may sum up the situation by saying that, although these satellites may be annoying to some nations, they are not aggressive; and that is the essential factor.

More confusion has now been created by the American Space Shuttle, which has been heavily criticised in the Soviet Union. It is perfectly true that many of the shuttle's missions will be military — yet it is as potentially neutral as any other vehicle.

The one new factor the shuttle does introduce is that, for the first time, it gives a space-faring power the ability to examine, and perhaps to retrieve, satellites belonging to somebody else, thus opening up prospects of "space piracy"—as the Soviet Union has imaginatively put it. I rather like the phrase, but it is of dubious legality—since, by definition, a sovereign state cannot commit acts of piracy. And with all respects to my American friends who are trying to promote free enterprise in space, I very much doubt if it will ever be quite *that* free.

However, one cannot help thinking that fears on this score have been greatly exaggerated. If you do not want anyone to capture your satellite, it is absurdly simple to boobytrap it and thus destroy, with very little trouble, an extremely expensive rival space system.

From past experience, I would venture a prediction in this area. When only the United States possessed reconnaissance satellites, there was a great outcry in the Soviet Union about these "illegal spy devices"; indeed, in 1962 it proposed to the United Nations that they be banned. But it reversed itself only a year later, when it began to develop its own "national means of verification"—to use the formula both sides use when they want to conceal facts perfectly well known to everyone else.

In the same way, when the long-expected Soviet Space Shuttle is launched, perhaps we will hear no more talk of space piracy. . . .

The essential point is that all these systems—communications, meteorological, geodetic, reconnaissance, and the shuttle itself—though they represent some degree of *militarisation* of space, are still, for the moment, defensive or even benign. Some countries may be upset by certain applications, but they can all live with them, accepting their benefits as well as their disadvantages. The new factor which has now entered the discussion is that of deliberately destructive space systems, i.e., weapons.

It seems to have been forgotten that

(continued on page 161)

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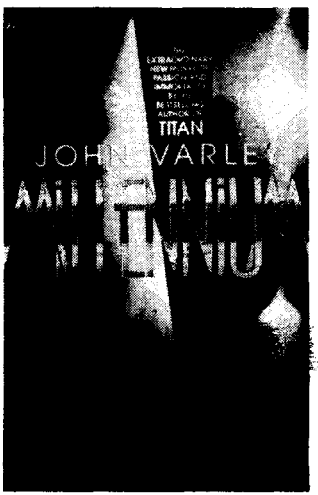

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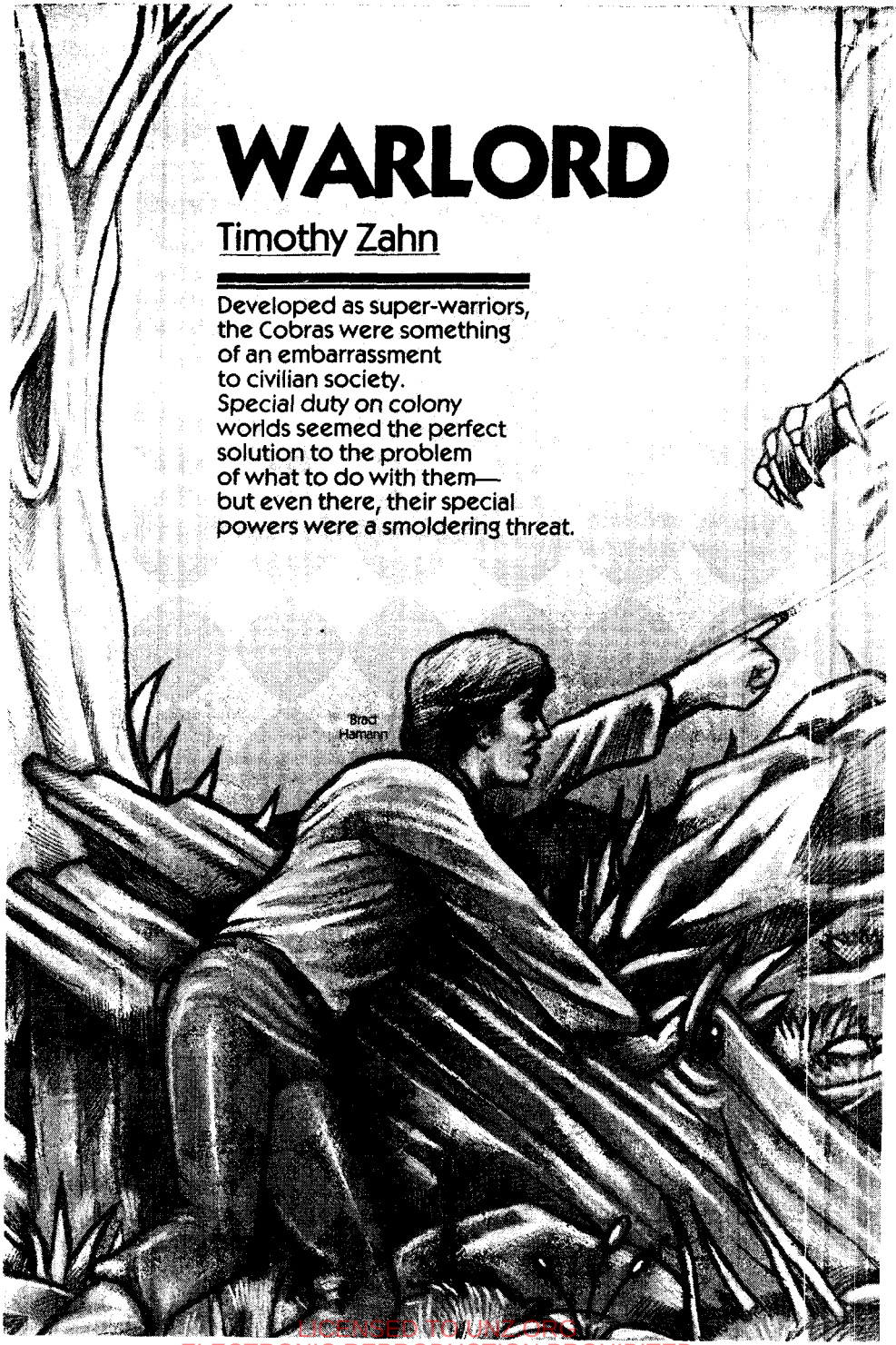
WARLORD

Timothy Zahn

Developed as super-warriors, the Cobras were something of an embarrassment to civilian society. Special duty on colony worlds seemed the perfect solution to the problem of what to do with them— but even there, their special powers were a smoldering threat.



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The boundary between field and forest was as sharp as a laser beam, the giant blue-green cyprenes running right up to the half-meter of orange vegebarrier insulating the tender wheat shoots from native plant encroachment. In his more philosophical moments Jonny Moreau saw a multi-leveled yin/yang in the arrangement: tall versus short, old versus young, native versus man-made. At the moment, though, his mood was anything but philosophical.

Looking up from the note, he found the youth who had delivered it standing in a rigid imitation of military attention. "And what exactly is this supposed to mean?" he asked, waving the note paper gently.

"The message is self-explanatory, sir—" the boy began.

"Yes, I can read," Jonny interrupted him. "And one more 'sir' out of you, Almo, and I'm going to tell your father on you. What I meant was, why did Challinor send you all the way out here just to invite me to a meeting? That's what these things are supposed to be for." He tapped the compact phone resting on his hip.

"Cee-two Challinor didn't want to take any chances on word leaking out about this, sir—Jonny," Almo corrected himself hastily. "It's a private meeting, for Cobras only."

Jonny studied the other's face a moment, then folded the paper and stuck it in his pocket. Whatever Challinor was trying to prove, browbeating his messenger boy wouldn't do any good. "You can give Challinor a definite 'maybe,' " he told Almo. "There's a spine leopard that's been poking around the edge of the forest lately. If I don't get it today I'll have to ride guard with Chin's planter tonight."

"Cee-two Challinor said I should emphasize the meeting was very important."

"So's my word—and I promised Chin he could start his second seedling run by tonight." Jonny reached for his phone. "If you'd like, I can call Challinor and tell him that myself," he suggested.

"No—that's all right," Almo said hastily. "I'll tell him. Thank you for your time." With that he took off across the field toward where his car was waiting.

Jonny felt a smile touch his lips, but his amusement quickly faded. There weren't a lot of teen-agers in this part of Aventine—the first two waves of colonists had all been childless, and two succeeding waves of families hadn't made up the deficit—and Jonny had always felt a twinge of pain for the enhanced loneliness he knew Almo and his peers must feel. The four Cobras assigned to Almo's town of Thanksgiving were obvious role models for the teen-age boys, at least, and Jonny was glad Almo had found a friend in Tors Challinor. At least, he used to be glad. Now, he wasn't entirely sure.

Almo's car took off with minimal dust, and Jonny turned both his face and attention to the towering trees. He'd worry about Challinor's cloak and dagger later; right now he had a spine leopard to kill. Making sure all the equipment on his belt was secured, he crossed the vegebarrier and entered the forest.

Even after seven years on Aventine Jonny still felt a sense of awe whenever he stepped under the ancient canopy of

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oddly shaped leaves that turned the day into a diffuse twilight. Partly it was the forest's age, he had long ago decided; but partly also it was the humbling reminder of how little mankind knew about the world it had so recently claimed as its own. The forest was teeming with plant and animal life, virtually none of which was really understood. Adjusting his built-in vision and auditory enhancers, Jonny moved deeper into the woods, trying to watch all directions at once.

The extra-loud snap of a branch above and behind him was his only warning, but it was enough. The nanocomputer implanted under his brain correctly interpreted the sound as being caused by a large airborne body, and almost before Jonny's brain had registered the sound the computer had fired the appropriate commands to the network of servo-motors buried under his musculature. Faster than possible with human reflexes, Jonny threw himself to the side—barely missing a gluevine-covered tree—just as four sets of claws slashed through the space he'd vacated. Jonny rolled through a somersault and into a crouch, facing the spine leopard. He got a glimpse of the creature as it leaped toward him, razor-edged quills tucked tightly against its forelegs—and again his computer took over.

Standing flatfooted, the only weapons Jonny could bring to bear were the two small lasers implanted in his little fingers; but even as it again threw him to the side his computer used them with deadly efficiency. Twin needles of light lanced out from his fingers, sweeping across the alien creature's eyes.

The spine leopard screamed, a full-bodied ululation that seemed to bounce off the inside of Jonny's stomach, and its spines snapped reflexively upright on its legs. The instinctive defensive move proved useless; Jonny was already beyond reach of the spine tips. Again he hit the ground, but this time he didn't roll back to his feet. Looking back over his shoulder, he saw the spine leopard struggling to get up, apparently oblivious to the black lines crisscrossing its face and to the brain damage behind them. A wound like that would have killed a human outright, but the less centralized alien metabolism wasn't as susceptible to localized destruction. The creature rose to its feet, spines still fully spread.

And a brilliant spear of light shot out of the heel of Jonny's left boot, catching the spine leopard in the head . . . and this time the destruction was more than adequate.

Carefully Jonny got to his feet, wincing at the fresh bruises the battle had given him, and feeling cautiously for broken bones. There wouldn't be any, of course—the ceramic laminae coating them rendered them unbreakable, for all practical purposes—but the habit had begun in his distant, tree-climbing past and had never left him. His ankle felt warm, but not uncomfortably so; the optical fibers that guided the light from the antiarmor laser in his calf to the flexible focusing lens in his heel absorbed very little of the beam. For the *n*th time Jonny wished the men who'd designed his Cobra gear had found a less awkward place to stick the laser—having to wear a special boot and have one foot off the ground to fire could be a real problem in the heat of battle. Still, he

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had to admit that the ability to fire at the enemy while running full-tilt away from them had saved his life more than once back on Adirondack.

Taking one last look around him, Jonny pulled out his phone and punched for the operator. "Ariel," the computer's voice said.

"Chin Reston," Jonny told it. A moment later the farmer's voice came on. "Reston here."

"Jonny Moreau, Chin. I got your spine leopard. I hope you didn't want it stuffed—I had to burn its head off."

"Hell with the head. Are *you* okay?"

Jonny smiled. "You worry too much—you know that? I'm fine; it never laid a spine on me. If you want I'll put a beacon on it and you can come get the pelt whenever you want."

"Sounds good. Thanks a lot, Jonny—I really appreciate it."

"No charge. Talk to you later." Pressing the off switch, Jonny again punched for the operator. "Kennet MacDonald," he told the computer.

There was a moment of silence. "No answer," the operator informed him.

Jonny frowned. Like all Cobras on Aventine, MacDonald carried his phone with him at all times. He was probably out in the forest or somewhere equally dangerous and didn't want to be distracted. "Record a message."

"Recording."

"Ken, this is Jonny Moreau. Call me as soon as you get a chance—preferably before this evening."

Switching off, Jonny returned the phone to his belt and unfastened one of the two tiny transponders from the underside of his emergency pouch. A flick of a switch set it in "operate" mode; stepping over the dead spine leopard, he dropped the device on its flank. For a moment he looked down at the creature, his eyes drawn to the foreleg spines. Aventine's biologists were unanimous in the opinion that the spines' placement and range of angles made them defensive rather than offensive weapons. The only problem was that no one had ever found any creature on the planet that a spine leopard might need such weapons to outfight. Personally, Jonny had no desire to be around when the first of that unknown species was discovered.

Reactivating his sensory enhancers, he began working his way back out of the forest.

MacDonald's call came in late in the afternoon, just as Jonny was looking over his pantry and trying to decide what to have for dinner.

"Sorry about the delay," MacDonald apologized after identifying himself. "I was out in the forest near the river most of the day with my phone turned off."

"No problem," Jonny assured him. "Spine leopard hunting?"

"Yeah. Got one, too."

"Likewise. Must be another migration; they don't usually find the territories we've cleared out quite this fast. We're probably going to be busy for a while."

"Well, things were getting dull, anyway. What's on your mind?"

Jonny hesitated. There *could* be a good reason why Challinor didn't want any word of his meeting going out on the airwaves. "Did you get any unusual messages today?" he asked obliquely.

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"Matter of fact, I did. You want to get together and talk about it? Wait a second—Chrys's trying to get my attention." A voice spoke unintelligibly in the background. "Chrys says you should join us for dinner in about half an hour, at her place."

"Sorry, but I've already got my own started," Jonny lied. "Why don't I come over when I've finished eating?"

"Okay," MacDonald said. "About seven, say? Afterward—well, maybe we can all go for a drive together."

Challinor's meeting was scheduled for seven-thirty. "Sounds good," Jonny agreed. "See you at seven."

Replacing his phone, Jonny grabbed a package at random from the pantry and took it over to the microwave. He would have liked to have joined the others for dinner—MacDonald and Chrys Eldjarn were two of his favorite people—and if Chrys's father hadn't been out of town doing emergency surgery he would have jumped at the invitation. But Chrys and MacDonald were a pretty steady couple, and they got little enough time to be alone together as it was. With only two Cobras to guard Ariel's four hundred sixty colonists from both Aventine's fauna and, occasionally, each other, spare time was at a premium.

Besides which, he thought wryly, spending more time in range of Chrys's smile would only tempt him to try and steal her away from MacDonald again, and there was no point in making trouble for himself like that. Their friendship was too valuable to him to risk messing it up.

He had a—for him—leisurely dinner and arrived at the Eldjarns' home at seven o'clock sharp. Chrys let him in, treating him to one of her dazzling smiles, and led the way to the living room, where MacDonald waited on the couch.

"You missed a great dinner," MacDonald greeted him, waving him to a chair.

"I'm sure you made up for my absence," Jonny said blandly. Half a head taller than Jonny and a good deal burlier, MacDonald had an ability to put food away that was known all through the district.

"I tried. Let's see your note."

Digging it out, Jonny handed it over. MacDonald scanned it briefly, then passed it to Chrys, who had curled up on the couch beside him. "Identical to mine," he told Jonny. "Any idea what it's all about?"

Jonny shook his head. "The *Dewdrop*'s been out surveying the nearest systems for the past couple of months. Do you suppose they found something interesting?"

" 'Interesting' as in 'dangerous'?" Chrys asked quietly.

"Possibly," MacDonald told her, "especially if this news is really only for Cobras. But I doubt it," he said, addressing Jonny. "If this were a war council or something we should all be meeting at Capitalia, not Thanksgiving."

"Unless they're passing the news out piecemeal, to the individual villages," Jonny suggested. "But that again drops it out of the 'emergency' category. Incidentally, who brought you the message? Almo Pyre?"

MacDonald nodded. "Seemed awfully formal, too. Called me 'Cee-two MacDonald' about four times."

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"Yeah, me too. Has Challinor instituted the old rank system over there, or something?"

"Don't know—I haven't been to Thanksgiving for weeks." MacDonald glanced at his watch. "I suppose it's time to remedy that deficiency, eh? Let's go see what Challinor wants."

"Come back after it's over and tell me what happened," Chrys said as they all stood up.

"It could be late before we get back," MacDonald warned as he kissed her good-bye.

"That's okay—Dad's coming home late, too, so I'll be up."

"All right. Car's out back, Jonny."

Thanksgiving was a good twenty kilometers east-northeast of Ariel along a dirt-and-vegebarrier road that was, so far, the norm in the newer areas of the human beachhead on Aventine. MacDonald drove, guiding the car skillfully around the worst of the potholes while avoiding the occasional tree branch reaching out from the thick forest on either side.

"One of these days a spine leopard's going to jump a car from one of those overhangs and get the surprise of his life," MacDonald commented.

Jonny chuckled. "I think they're too smart for that. Speaking of smart moves, you and Chrys to the point of setting a date yet?"

"Umm . . . not really. I think we both want to make sure we're right for each other."

"Well, in my opinion, if you don't grab her while you've got the chance you're crazy. Though I'm not sure I'd give her the same advice."

MacDonald snorted. "Thanks a kilo. Just for that I may make you walk home."

Challinor's house was near the outskirts of Thanksgiving, within sight of the cultivated fields surrounding the village. Two other cars were already parked there; and as they got out and headed for the house the front door opened, revealing a slender man in full Cobra dress uniform. "Good evening, Moreau; MacDonald," he said coolly. "You're twenty minutes late."

Jonny felt MacDonald stiffen beside him and hurried to get in the first word. "Hello, L'est," he said, gesturing to the other's red and black diamond-patterned outfit. "I didn't realize this was a costume party."

Simmon L'est merely smiled thinly, a mannerism whose carefully measured condescension had always irritated Jonny. But the other's eyes showed the barb had hit its target. MacDonald must have seen that, too, and brushed silently by L'est without delivering the more potent blast he'd obviously been readying when Jonny stepped in. Breathing a bit easier, Jonny followed his friend in, L'est closing the door behind them.

The modest-sized living room was comfortably crowded. At the far end, on a straight-back chair, sat Tors Challinor, resplendent in his own Cobra dress uniform; at his right, looking almost drab in their normal work clothes, were Sandy Taber and Barl DesLone, the two Cobras stationed in Greensward. Next to them, also in dress uniforms, were Hael Szintra of Oasis and Franck Patrusky of Thanksgiving.

"Ah—MacDonald and Moreau," Challinor called in greeting. "Come in;

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your seats are right up here." He indicated the two empty chairs to his left.

"I hope this is really important, Challinor," MacDonald growled as the two men crossed the room and sat down. "I don't know what things are like in Thanksgiving, but we don't have a lot of time in Ariel for playing soldier." He glanced significantly at the uniforms.

"As it happens, your lack of spare time is one of the topics we want to discuss," Challinor said smoothly. "Tell me, does Ariel have all the Cobras it deserves? Or does Greensward, for that matter?" he added, looking at Taber and DesLone.

"What do you mean, 'deserves'?" Taber asked.

"At last count there were about ten thousand people in Caravel District and exactly seventy-two Cobras," Challinor said. "That works out to one Cobra per hundred-forty people. Any way you slice it a town the size of Greensward ought to have *three* Cobras assigned to it, not two. And that goes double for Ariel."

"Things seem reasonably calm at the moment in Ariel," MacDonald said. "We don't really need any more firepower than we've got." He looked at Taber. "How are conditions around Greensward?"

"Firepower isn't the issue," Szintra put in before Taber could answer. "The point is that we're required to do a lot more than just guard our villages against spine leopards and falx. We have to hunt down wheat snakes, act as patrollers in domestic squabbles—and if we have any spare time left we're supposed to help cut down trees and unload supply trucks. And we get *nothing* in return!"

Jonny looked at Szintra's flushed face, then at the other three uniformed men. A cold knot was beginning to form over his dinner. "Ken, perhaps we should get back to Ariel," he said quietly to MacDonald.

"No—please stay a while longer," Challinor spoke up hastily. "Cee-three Szintra was a bit more forceful than necessary, but stuck all alone out in Oasis he perhaps sees matters more clearly than some of the rest of us."

"Let's assume for the present that he's right, that we don't get the respect we deserve," MacDonald said. "What solution are we discussing here?"

"It's not simply lack of respect, or even the way we always seem to be taken for granted," Challinor said earnestly. "It's also the way the syndic's office takes forever to process the simplest requests for equipment or supplies—though they're prompt enough when it comes to picking up surplus wheat and gluevine extract when we have it. They seem to have forgotten that the whole planet isn't as comfortable as Rankin and Capitalia, that when a frontier town needs something we need it *now*. Add to that the mania for making lots of little frontier settlements instead of consolidating the territory we've got—which is why we're spread so damn thin—and you get a picture of a government that's not doing its job. To put it bluntly, we feel something has to be done about it."

There was a long moment of silence. "What do you suggest?" DesLone asked at last. "That we send a petition

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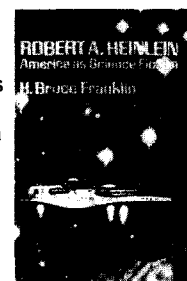

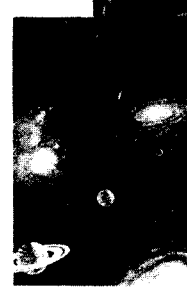

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to the Dominion with the next courier ship?''

''Don't be denser than you have to, Barl,'' Taber growled. ''They're talking about replacing Governor-General Zhu themselves.''

''Actually, our thinking is that more than the governor-general needs changing,'' Challinor said calmly. ''It's painfully clear that the centralized system that works so well once a world is established is failing miserably on Aventine. We need something more decentralized, something more responsive to the planet's needs—''

''Governed by those who'd do the best job?'' Jonny cut in. ''Us, for instance?''

''In many ways our struggle to tame Aventine is analogous to the guerrilla war we waged against the Trofts on Silvern and Adirondack,'' Challinor said. ''If I do say so myself, we did a hell of a job back then—don't you agree? Who on this planet could do better?''

''So what are you suggesting?'' MacDonald asked, his tone far more interested than it had any business being. ''We carve Aventine up into little kingdoms, each one run by a Cobra?''

''Basically,'' Challinor nodded. ''It's a bit more complicated than that—there'd have to be a loose hierarchy to settle disputes and such—but that's the general idea. What do you say? Are you interested?''

''How many of you are there?'' MacDonald asked, ignoring the question.

''Enough,'' Challinor said. ''The four of us here, plus the three from Fallow, two from Weald, and three more from Headwater and the lumber camps upslope of the Kerseage Mines.''

''You propose to take over an entire world with twelve Cobras?''

Challinor's brow furrowed slightly. ''No, of course not. But I've talked to a lot of other Cobras, both in and out of Caravel District. Most of them are willing to wait and see what happens with our experiment.''

''In other words, to see how hard Zhu comes down on you when you declare independence?'' MacDonald shook his head. ''Your thinking's got loose connections, Challinor. No Cobra's going to be allowed to stay neutral in something like that—they'll be ordered to come here and restore the syndic's rule, and their answer to that order will put them on one side or the other. With the odds at—let's see; twelve Cobras out of six hundred twenty makes it about fifty to one—which way do you think they'll jump?''

''Which way are *you* jumping, MacDonald?'' L'est cut in suddenly from his seat by the door. ''You ask a lot of questions for someone who hasn't committed himself yet.''

MacDonald kept his eyes on Challinor. ''How about it, Challinor? This is going to take more than an ace or two up your sleeve.''

''I asked you a question, damn it!'' L'est snapped.

Deliberately, MacDonald turned to face the other; just as leisurely he got to his feet. ''I stand where I and my family have always stood: with the Dominion of Man. What you're talking is treason, gentlemen; I won't have any part of it.''

L'est was on his feet now, too, stand-

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ing sideways to MacDonald in a Cobra ready stance. "The loyalty of an EarthScot or a fine dog," he sneered. "In case you haven't noticed, EarthScot, this Dominion you're so eager to please is treating you like dangerous garbage. It's thrown you just as far away as it possibly could, with a hundred fifty light years and two hundred billion Trofts between you and civilization."

"We're needed here for the colonization effort," Jonny interjected, wanting to stand in MacDonald's support but afraid the action might be misinterpreted. In such close quarters an all-out fire fight between the two Cobras would probably be lethal to everyone in the room.

"That's donk dung, Moreau—we're here because it was cheaper than starting a new war with the Trofts or Minthisti just to kill all of us off," L'est ground out. "The Dominion doesn't care if we live or die out here. It's up to us to insure our own survival—no matter what sort of short-sighted fools get in our way."

"You coming, Jonny?" MacDonald asked, taking a step toward the door.

L'est took a step of his own, putting himself directly in front of the door. "You're not leaving, MacDonald. You know too much."

"Take it easy, Simmon," Challinor said, his tone calm but with steel underlying it. "We're not giving these gentlemen a choice between joining us or death."

L'est didn't move. "You don't know this clown, Tors. He's a troublemaker."

"Yes, you told me that earlier. Cee-two MacDonald, please understand that we're not doing this simply for our own personal gain." Challinor's voice was pure sincerity. "The people of Aventine need strong, competent leadership, and they're not getting it. It's our *duty* to these people—these citizens of the Dominion—to save them from disaster."

"If your friend over there doesn't get out of the way, I'm going to have to move him myself," MacDonald said.

Challinor sighed. "Simmon, step aside. MacDonald, will you at least think about what I've said?"

"Oh, I'll think about it all right." With his eyes still on L'est, MacDonald moved toward the door.

Carefully, his attention on the still-seated Patrusky and Szintra, Jonny got to his feet and followed. "If you'd like to stay, Moreau," Challinor called after him, "we can get you back to Ariel later."

"No, thanks," Jonny said, glancing back over his shoulder. "I have some work I need to finish up tonight."

"All right. But think about what we've said, all right?"

The words were friendly, but something in the tone made the hairs on Jonny's neck tingle. Suppressing a shiver, he got out fast.

The drive back to Ariel was quiet. Jonny, expecting MacDonald to be somewhere on the far side of furious, braced himself for a hair-raising ride on the bumpy road. To his surprise, though, MacDonald drove with a calmness that bordered on the sedate. But the backwash of the car's headlights showed clearly the tension in his jaw and around his eyes. Jonny took the cue and kept his mouth shut.

Lights were still showing in the Eld-

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jarn house when MacDonald brought them to a stop across the street. Parked in front of them was the car Chrys's father had taken to Rankin; obviously, he'd arrived home too late to take it back to the village garage.

As before, Chrys answered the door. "Come on in," she invited, stepping to one side. "You're earlier than I expected—short meeting?"

"Too long," MacDonald growled.

Chrys's eyes took on a knowing look. "Uh-oh. What happened—Challinor want you to petition for more Cobras again?"

MacDonald shook his head. "Nothing so amusing. They want to take over the planet."

Chrys stopped in mid-stride. "They *what?*"

"You heard me. They want to overthrow the governor-general and set up a warlord system with little fiefdoms for all of the Cobras who join him."

Chrys looked at Jonny. "Is he kidding me, Jonny?" she asked.

Jonny shook his head. "No. Challinor's dead serious about it. I don't know how they hope to do anything but get themselves crushed, though—"

"Just a second," she interrupted, moving toward the door to the bedroom wing. "I think Dad had better hear this."

"Good idea," MacDonald grunted, stepping to the corner liquor cabinet and pouring himself a drink. Holding up the bottle, he looked questioningly at Jonny, who shook his head.

A couple of minutes later Chrys was back, a dressing-gowned man in tow. "Ken; Jonny," Dr. Orrin Eldjarn nodded to them, looking wide awake despite his sleep-tousled hair. "What's this about some kind of cabal being formed?"

They all sat down, the Eldjarns listening intently as MacDonald gave them a capsule summary of Challinor's proposal. "But as Jonny said," he concluded, "there's just no way they can succeed. One Cobra's fighting strength is essentially the same as another's, after all."

"But orders of magnitude higher than anyone else's," Eldjarn commented. "If Challinor announced he was taking over Thanksgiving, there's really nothing the people there could do to stop him."

"Surely there are a few other weapons there," Chrys argued. "We've got at least a half dozen pellet guns here in Ariel, and Thanksgiving's bigger than we are."

"Pellet guns would be essentially useless against a Cobra except in cramped quarters where he couldn't maneuver," Jonny told her. "The firing mechanism has a distinctive click that's loud enough for us to hear, and we'd normally have no trouble getting out of the line of fire. The Troft occupation forces on Silvern took forever to learn that lesson."

"But that's not the point," MacDonald said. "To kill twelve rebel Cobras, all it should take is twelve more Cobras—or maybe fifty if the rebels are dug in and you want an absolutely sure victory. Challinor has to know that."

"So the question is, what else does he know—that we don't." Eldjarn stroked his chin thoughtfully. "Anything happening elsewhere on Aventine that might be pinning down large num-

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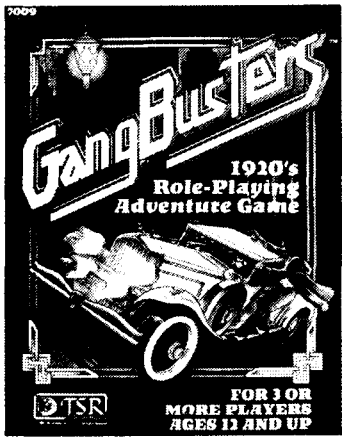

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bers of Cobras? Civil unrest in one of the other districts or something?"

Jonny and MacDonald exchanged glances, and the latter shrugged. "Nothing we've heard of," he said. "I suppose it's conceivable that Challinor's organized groups in other towns for a simultaneous declaration, but I don't really believe it."

"The spine leopards are on the move again," Jonny suggested doubtfully. "That'll keep a lot of Cobras on patrolling and hunting duty unless the farmers want to stay out of their fields for a few days. I can't see that worrying the governor-general, though. Maybe Challinor's just lost his mind."

"Not Challinor." MacDonald was definite. "He's as sharp and level-headed as they come. And L'est wouldn't have come in on this on the strength of Challinor's sales talk alone, either—that one was a weasel even before we hit Aventine."

"I'm inclined to agree," Eldjarn said slowly. "The timing here is too good for megalomaniacs to have come up with. As you pointed out, Jonny, the spine leopard migration will hinder any official countermeasures, at least a little. Less coincidental, I'm sure, is the fact that the Dominion courier ship left Capitalia just a few days ago, which means it'll be six months before anyone from the Dominion touches down here again."

"Plenty of time to consolidate a new regime," MacDonald growled. "They can present the courier with a *fait accompli* and dare the Dominion to do something."

"And the *Dewdrop*'s out somewhere in deep space," Jonny said with a grimace.

"Right," Eldjarn nodded. "Until it gets back there's no way for Zhu to get in touch with the Dominion—and even then if the *Dewdrop* can't land somewhere secure for fuel and provisions it won't be able to go for help. No, Challinor's thought this out carefully. It's a shame you couldn't have played along a little longer and found out the rest of his plan."

"I did what I could," MacDonald said, a bit stiffly. "I won't lie about my loyalty to anyone."

"Sure—I understand," Eldjarn said.

For a moment the room was silent. "I suppose *I* could go back to them," Jonny said hesitantly. "I never really stated where I stood."

"They'd be suspicious," MacDonald said, shaking his head. "And if they caught you passing information to us they'd treat you as a spy."

"Unless, of course," Chrys said quietly, "you *want* to go back."

Her father and MacDonald looked at her in surprise, but her gaze remained on Jonny. "After all, we've been assuming Jonny was solidly on our side," she pointed out calmly. "Maybe he hasn't really made up his mind. This isn't a decision that we should be making for him."

Eldjarn nodded agreement. "You're right, of course. Well, Jonny? What do you say?"

Jonny pursed his lips. "To be completely honest, I don't know. I swore an oath of allegiance to the Dominion, too—but the government here really *is* doing some potentially disastrous things, especially the overextending of people

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and resources. What Challinor said about our duty being to the *people* of Aventine isn't something I can dismiss out of hand."

"But if the legal avenues for political change are ignored—by anyone—you open the way for total anarchy," MacDonald argued. "And if you really think Challinor and L'est would do a better job—"

"Ken." Chrys put a restraining hand on his arm. To Jonny, she said, "I understand your uncertainties, but I'm sure you realize this isn't an issue you'll be able to stay neutral on."

"And you'll need to make your decision soon," Eldjarn pointed out. "Challinor wouldn't have risked telling such a long-shot as Ken about the plot unless they were almost ready to move."

"I understand." Jonny got to his feet. "I think perhaps I'd better go home. If I decide to actively oppose Challinor you can always fill me in later on anything you come up with tonight. At any rate—" he met MacDonald's gaze firmly—"what's been said here already is between the four of us alone. Challinor won't hear any of it from me."

Slowly, MacDonald nodded. "All right. I guess that's all we can expect. You want a ride home?"

"No thanks; I'll walk. Good night, all."

Like the farming communities Jonny had known on his native Horizon, Ariel generally closed down fairly early in the evening. The streets were dark and deserted, with the only illumination coming from occasional streetlights and the brilliant stars overhead. Usually, Jonny liked looking at the stars whenever he was out this late; tonight, he hardly noticed they were there.

There had been a time, he thought wryly, when simply gazing into Chrys's eyes would have immediately brought him onto her side, no matter what the cause or topic at issue. But that time lay far in his past. A war against invading aliens, his failed attempts to reenter the mainstream of society when he returned from that war, and seven long years of working to build a new world had all taken their toll on the rashness of youth. He had long ago learned not to base his decisions on emotional reasoning.

The trouble was that, at the moment, he didn't have a terrific number of facts on which to base an intelligent decision. So far everything pointed to a quick defeat for Challinor's group . . . but there *had* to be more to it than the obvious. Whatever his other irritating characteristics, Simmon L'est was an excellent tactician, his father having been an instructor at the military academy on Asgard. He wouldn't join any venture that was obviously doomed—and a long, bloody war would be disastrous for the colony.

On the other hand, Jonny's allegiance *was* technically to the government of the Dominion and, by extension, to Aventine's governor-general. And despite L'est's sneers, MacDonald's sense of loyalty had always been something Jonny admired.

His brain was still doing flip-flops when he reached home. The usual bedtime preparations took only a few minutes; then, turning off the light, he got into bed and closed his eyes. Perhaps by morning things would be clearer.

But he was far too keyed up to sleep.

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Finally, after an hour of restlessly changing positions, he went to his desk and dug out the tape from his family that had come with the last Dominion courier. Putting it on the player, he adjusted the machine for sound only and crawled back into bed, hoping the familiar voices would help him relax.

He was drifting comfortably toward sleep when a part of his sister's monologue seemed to pry itself under a corner of his consciousness. ". . . I've been accepted at the University of Aerie," Gwen's playful voice was saying. "It means finishing my schooling away from Horizon, but they've got the best geology program in this part of the Dominion and offer a sub-major in tectonic utilization. I figure having credentials like that's my best chance of getting accepted as a colonist to Aventine. I hope you'll have enough pull out there by the time I graduate to get me assigned to Ariel or wherever you are by then—I'm not just coming out there to see what the backside of the Troft Empire looks like, you know. Speaking of Trofts, there was a sort of informal free-for-all debate in the hall at school the other day on whether the Aventine project was really just an Army plot to outflank the Trofts so that they wouldn't try to attack us again. I think I held up our end pretty well—the stats you sent on the output of the Kerseage Mines were of enormous help—but I'm afraid I've ruined any chance I might ever have had of passing myself off as demure or ladylike. I hope there's no ban on letting in rowdies out there. . . ."

Getting up, Jonny switched the player off . . . and by the time he got back into bed he knew what his decision had to be. Gwen had been talking about joining him on the Dominion's new colony even before the first ships had begun the long trip through the Troft Corridor to the unnamed planet the survey team had chosen. Her cheerful tapes to him, full of confidence and borderline hero worship, had helped him over the roughest times in a way that the quieter support of his parents and brother Jame hadn't been able to duplicate. To willingly take on the label of traitor—especially when the situation was by no means desperate yet—would be a betrayal of both Gwen's pride and his family's trust. And that was something he would never willingly do.

For a moment he considered calling MacDonald to tell the other of his decision . . . but the bed felt more and more comfortable as the tension began to leave him. Besides, it was getting late. Morning would be soon enough to join the loyalist cause.

Five minutes later, he was sound asleep.

He woke to the impatient buzz of his alarm, and as he rubbed the sleep from his eyes the answer popped into his mind. For a moment he lay still, his mind busy sorting out details and possibilities. Then, rolling out of bed, he snared his phone and got the operator. "Kennet MacDonald," he told it.

The wait was unusually long; MacDonald must have still been asleep. "Yes; hello," his voice finally came.

"It's Jonny, Ken. I know what Challinor's up to."

"You do?" MacDonald was suddenly alert. "What?"

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"He's going to take over the Kerseage Mines."

Another long pause. "Damn," MacDonald said at last. "That has to be it. Over half of Aventine's rare-earth elements alone come from there. All he'd have to do is use the mine's explosives cache to doomsday the shafts and entrances—Zhu would have to think long and hard about sending a massive force to evict him."

"And the longer Zhu hesitates the weaker he looks," Jonny said, "and the more likely some of Challinor's 'neutral' Cobras will see him as the probable winner and shift sides. If enough do that Zhu'll either have to capitulate or risk civil war."

"Yeah. *Damn*. We've got to alert Capitalia, get them to send a force up there before Challinor makes his move."

"Right. You want to call them or shall I?"

"It'd be better if we were both on the line. Hang on; let's see if I remember how to do this—"

There was a double click. "Ariel," the operator said.

"The governor-general's office in Capitalia," MacDonald told it.

"I'm sorry, but I am unable to complete the call."

Jonny blinked. "Why not?"

"I'm sorry, but I am unable to complete the call."

"Do you suppose the satellite's out of whack?" Jonny suggested hopefully.

"Not likely," MacDonald growled. "Operator: Syndic Powell Stuart's office in Rankin."

"I'm sorry, but I am unable to complete the call."

And Rankin wasn't far enough away to require the communication satellite.

"So much for coincidence," Jonny said, feeling a knot forming in his stomach. "How did Challinor get to the phone computer so fast?"

"He could have done this any time in the past few days," MacDonald grunted. "I doubt if anyone's needed to talk to Capitalia or Rankin lately; certainly not since the courier ship left."

"Maybe that's why he sent Almo Pyre with notes instead of calling us from Thanksgiving," Jonny suggested, suddenly remembering. "Maybe all out-of-town contact's been halted."

"Maybe. Listen, I don't like using this phone, all of a sudden. Let's meet at Chrys's shop in, say, half an hour."

"Right. Half an hour."

Jonny clicked off the phone, and for a moment he stared at the little box, wondering if anyone had been eavesdropping on the conversation. Unlikely . . . but if Challinor could fix the computer to block out-of-town calls, why not also set up something to monitor all in-town ones?

Jumping out of bed, he began pulling on his clothes.

One of Ariel's two fully qualified electronics technicians, Chrys shared a two-floor combination office/shop/storeroom near the roughly circular area in the center of town which was known, presumably for historical reasons, as the Square. Jonny got there early and waited nervously outside until Chrys and MacDonald arrived with the keys.

"Let's get inside," MacDonald urged, glancing around at the handful of other people that had appeared on the streets as the village began its preparations for

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the new day. "Challinor may have hired a spy or two in town."

Inside, Chrys turned on some lights and sank into her workbench chair, yawning prodigiously. "Okay, we're here," she said. "Now would you care to explain what we needed me to do here on five hours' sleep and ten minutes' notice?"

"We're cut off from both Rankin and Capitalia," MacDonald told her. "Challinor's apparently jinxed the phone computer." He went on to describe Jonny's idea about the Kerseage Mines and their attempt to alert the authorities. "Besides the water route up the Chalk River, the only land routes to the Mines are the roads from Thanksgiving and Weald," he explained. "Challinor's in position to block both of them, and if he can control the river here at Ariel the governor-general won't have any way to move in forces or equipment except by aircar."

"*Damn* him," Chrys muttered, her eyes wide awake now and flashing sparks. "If he's fouled up all the long-distance circuits it'll probably take a week to repair the damage."

"Well, that answers my first question," MacDonald said grimly. "Next question: Can you build a transmitter of any kind here that can bypass the operator entirely and run a signal to Capitalia via the satellite?"

"In theory, sure. In practice—" She shrugged. "I haven't built a high-frequency focused-beam transmitter since my first year at school. It would take at least two or three days' work, even assuming I've got all the necessary equipment."

"Can you use some of your spare telephone modules?" Jonny suggested. "That should at least save you some assembly time."

"Provided I don't overlap one of the regular frequencies and trigger a squelch reaction from the phone computer, yes," she nodded. "Readjusting built-in freq settings may take just as long as building from scratch, but it's worth a try."

"Good. Get to work." MacDonald turned to Jonny. "Even if Challinor didn't set up a flag to let him know when anyone tries to call Capitalia, we should assume he'll be moving against us soon. We'll need to alert Mayor Tyler and organize whatever we can in the way of resistance."

"Which is basically you and me," Jonny said.

"Plus those half-dozen pellet guns Chrys mentioned last night." He saw Jonny's expression and shrugged uncomfortably. "I know—living clay pigeons. But you know as well as I do that our reflex computers react more slowly when faced with two or more simultaneous threats. It might just give us the edge we'll need."

"Maybe." All the ghosts of Adirondack and Silvern were rising behind Jonny's eyes—the ghosts of civilians caught in the fighting between the Cobras and Trofts. To go through that again . . . "What would we be doing, trying to guard the road from Thanksgiving?"

MacDonald shook his head. "There's no way we can keep them out—they can abandon the road whenever they please if they don't mind having to kill a spine leopard or two on the way into town and don't need to bring in any heavy equipment. No, the best we can hope for is

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to hold this building until Chrys can finish a transmitter that'll bring help from Capitalia."

"Maybe we should try the innocent approach, too," Chrys suggested, looking up from the book of circuit diagrams she'd been paging through. "As long as they haven't actually invaded yet, why don't we have someone—Dad, for instance—try to drive through Thanksgiving to Sangraal and call Capitalia from there?"

"I doubt if Challinor's letting any traffic travel east from here," MacDonald said, "but it's worth a try. You think your dad would be willing?"

"Sure." She reached for her phone . . . hesitated. "Maybe I'd better just ask him to come over and then explain things once he gets here. Challinor may have put a monitor in the system."

The call took half a minute; Eldjarn asked no questions and said he'd be there right away. As Chrys broke the connection, MacDonald started for the door. "I'm going to find the mayor," he said over his shoulder. "Jonny, you stay here—just in case. I'll be back as soon as I can."

Eldjarn had come and gone, and Chrys had been working for an hour and a half when they heard the shot.

"What was *that?*" Chrys asked, looking up from her breadboard.

"Pellet gun," Jonny snapped, already moving toward the door. "You'd better stay here while I—"

"Forget it," she said, setting her solderer down carefully and racing after him. "Ken's out there!"

There was no second shot, but even so they had no problem locating the scene of the trouble. Already thirty or more people had gathered around the edge of the Square; more, like Jonny and Chrys, were hurrying in that direction. Off to the side, at one corner of the building housing the mayor's office, lay a crumpled figure. Kneeling over him was MacDonald.

"Halt!" an authoritative voice barked, as Jonny and Chrys pushed through the clump of spectators and headed for MacDonald. "Stay away from him."

Jonny glanced at the speaker without slowing. "The hell with you, L'est," he said. "The man's hurt!"

The laser blast Jonny had half expected to take in the back didn't come, and they reached MacDonald without further incident. "What can we do?" he asked as they dropped to their knees beside him. The other Cobra, Jonny saw now, was pumping rhythmically on the injured man's sternum with the heel of his hand.

"Ventilate him," MacDonald snapped; but Chrys had anticipated the order and was already beginning mouth-to-mouth. Johnny opened the charred shirt gingerly, wincing as he saw the location of the burn. "What happened?"

"Challinor got here about fifteen minutes ago and told Mayor Tyler they were taking over," MacDonald said tightly. "We weren't in any kind of defense posture yet, but Insley tried to take a shot at him anyway." He swore viciously. "Challinor got out of the way and behind cover. There wasn't any reason to shoot to kill—but L'est apparently felt we needed an object lesson."

Jonny looked over MacDonald's

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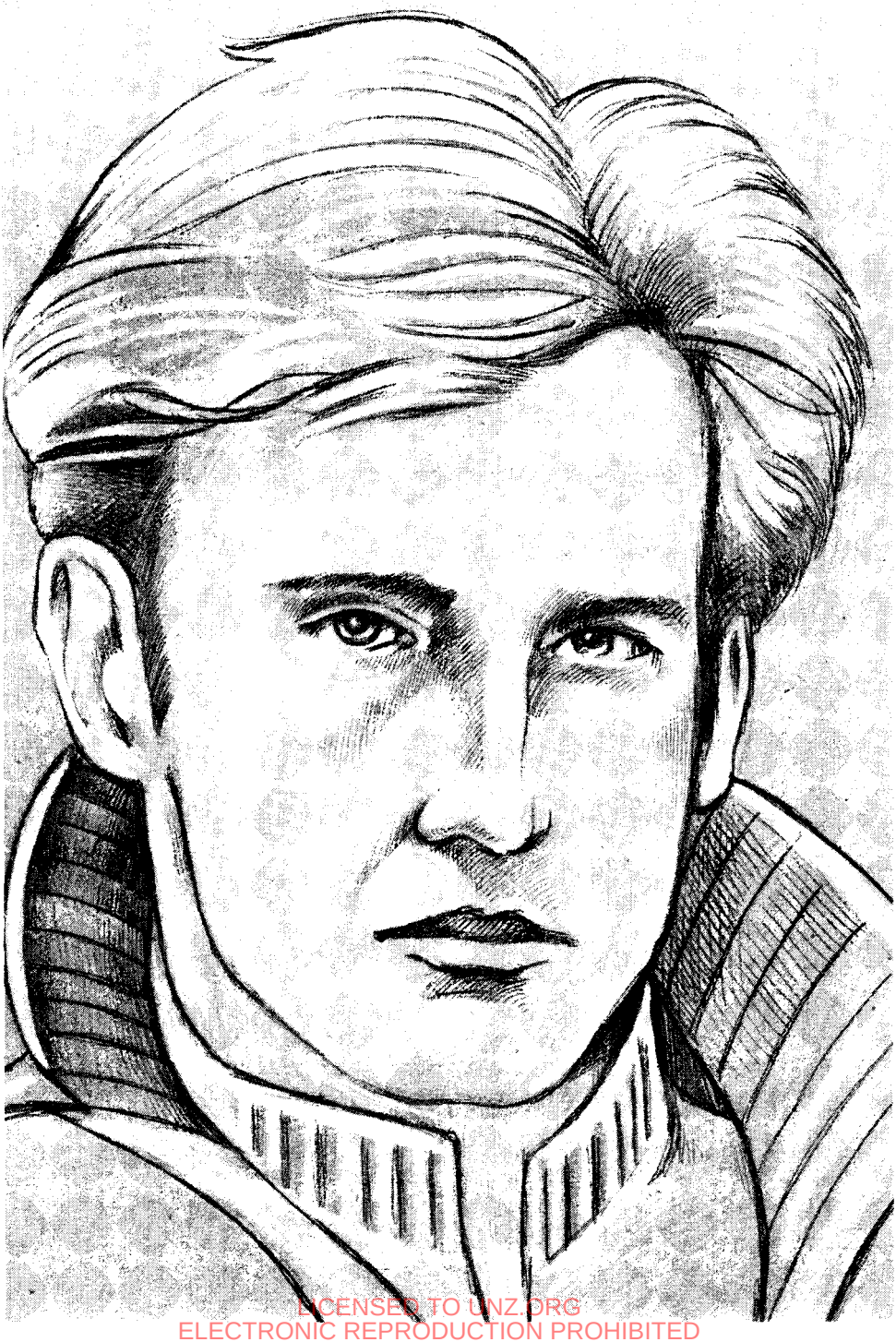

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shoulder. L'est was still standing near the center of the Square, watching them. Glancing around, he noticed for the first time that four more Cobras were also present, spaced more or less evenly around that end of the Square: the two men who besides L'est had been at Challinor's the night before, Challinor himself, and— "Sandy Taber's joined them," he said.

MacDonald grunted. "Chrys?" he asked.

She moved her face away from Insley's and shook her head. "There's no pulse in the carotid artery," she said gently. "Hasn't been since we got here. I'm sorry, Ken."

For a long moment MacDonald looked at her, his hands still in position on the dead man's chest. Then, slowly, he stood up and turned back toward the Square, his face like a thundercloud sculpted from stone. "Keep her clear, Jonny," he murmured, and started walking toward L'est.

The action was so casual that he was four steps away before Jonny understood exactly what the Cobra was planning. Simultaneously, a hissing intake of air behind him told him Chrys also had suddenly realized what was going to happen. "Ken!" she blurted, leaping to her feet.

Jonny was faster, standing up and grabbing her in an unbreakable grip before she could get past him. "Stay here," he whispered urgently into her ear. "You can't do anything for him out there."

"Jonny, you have to stop him!" she moaned as she struggled against him. "They'll kill him!"

For Jonny, it was the hardest decision he'd ever made in his life. Every instinct screamed at him to step into the Square and begin shooting, to try and knock out one or more of the Cobras waiting silently in their circle. To him it was obvious that Insley's death had been a deliberate effort on L'est's part to provoke precisely this reaction; to goad MacDonald into a confrontation where all the numerical and tactical advantages were theirs. But equally obvious was the fact that there was nothing he could do to change the coming battle's outcome. At five-to-two odds he and MacDonald together would die just as surely as MacDonald alone . . . and with both of their Cobra defenders gone the people of Ariel would have no way at all to fight back against Challinor's fledgling warlords. Even more than it had been the previous night, it was clear where his duty lay.

And so he clung tightly to Chrys and watched as they killed his friend.

It was a short battle. Even burning with rage, MacDonald had enough sense not to simply come to a halt and try to gun L'est down. Halfway through one of his strides he abruptly let his right leg collapse beneath him, dropping straight down onto the ground. Simultaneously, his arms snapped up, the lasers in his little fingers sending fire to both sides. Patrusky and Szintra, at the receiving ends of the two blasts, reacted instantly, twisting aside as their own nanocomputers responded with return fire. An instant later there were twin howls of pain as MacDonald's reflexes got him out of the way in time for the renegade Cobras' shots to cross the Square and hit each other . . . and from his prone position on the ground

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MacDonald brought his left leg to bear on L'est.

He never got a chance to fire. With his own lightning reflexes and servo-augmented muscles L'est leaped in a six-meter-high arc that took him almost directly over his opponent. MacDonald moved with desperate speed to get his hands up . . . but L'est's leg got to firing position first.

The Square lit up for an instant, and it was all over.

Beside him, Jonny felt the tension drain out of Chrys's body. For a moment he thought she would either faint or become hysterical . . . but when she spoke her voice was quiet and firm. "Let me go to him, Jonny. Please."

He hesitated, knowing what it would look like. "It'll be pretty bad—"

"Please."

They went together, Jonny with his arm still around her.

It was, indeed, pretty bad. L'est's antiarmor blast had caught MacDonald high in the chest, destroying his heart and probably a good percentage of his lung tissue. His arms lay limply on the ground, indicating that the connections between nanocomputer and arm servos had also been destroyed, denying the Cobra even the satisfaction of one last dying shot.

"Such a terrible waste."

Jonny turned slowly, disengaging his arm from Chrys's shoulders and taking a half step away from her. "Yes, it is, isn't it, Challinor?" he said to the man standing before him, a white-hot anger beginning to burn through his mind. "A shame he didn't try for you and your chief butcher instead of your two dupes."

"He attacked first. You saw that—you all saw that," Challinor added, raising his voice for the benefit of the stunned crowd. "Cee-three L'est was protecting you, as is his duty."

All the possible responses collided deep in Jonny's throat; what came out was an animalistic growl. Challinor regarded him thoughtfully. "I'm sorry about your friend—truly I am," he said quietly. "But we can't allow opposition to our plan. We're going to remake Aventine, Moreau; and the faster and stronger our first stroke, the more likely the governor-general will capitulate without unnecessary bloodshed."

Taber came up to Challinor's side. "Szintra is dead," he reported, avoiding Jonny's eyes. "Patrusky's going to be out of action for a few days, but none of his burns are really dangerous."

Challinor nodded. "I underestimated him rather badly," he mused. "I thought he was too angry to be thinking tactically. A dangerous man—I wish he'd been on our side."

"I'm going to kill you, Challinor," Jonny ground out. "You set Ken up to be killed, and you're going to die for that."

Challinor didn't move, but his gaze tightened slightly. "You're welcome to try," he said softly. "But you can't stop us. L'est will carry on in my place if I die; would you rather he be in charge? And don't expect you'll get all of us. MacDonald was lucky to do as much damage as he did."

Jonny didn't reply. Like a surfer on a wave, his tactical sense was riding the crest of his rage, calculating odds and possibilities with abnormal speed and clarity. Challinor stood before him, Taber slightly to his left, L'est somewhere

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behind him. An imperceptible bending of the knees could let him jump high enough to deliver lethal head kicks to the two in front of him; if L'est was watching the crowd for signs of hostility Jonny might be able to get in the first shot there, too—

"No!" Chrys's unexpected grip on his arm froze his thoughts in mid-stride. "Don't do it, Jonny. I've lost Ken already—I don't want to lose you, too."

Jonny closed his eyes and took a deep, ragged breath. *My duty to Ariel does not include throwing my life away in anger*, he thought at the white heat within him . . . and slowly the bonfire cooled to more controllable embers.

He opened his eyes. Challinor and Taber were watching him tensely. "Dr. Eldjarn had to go to Sangraal this morning," he told Challinor evenly. "You'll need to release our phone system so that we can call him back."

The two renegade Cobras relaxed fractionally. "No need," Challinor said. "He'll be back at home in a few minutes, if he's not there already. Our roadblock stopped him on the way out of Thanksgiving, of course. You really shouldn't have tried to get a message out like that—you left us no choice but to move in."

There was nothing to say to that. Taking Chrys's arm, Jonny led her away.

"His great-grandfather was the last of six MacDonald generations to hold commissions in the Fifty-First Highland Division on Earth—did you know that?"

Jonny nodded silently. Chrys had been curled up on the couch, talking almost nonstop about MacDonald, since their arrival back at her home several hours previously. At first Jonny had been worried, wondering whether she was retreating into some sort of personal fantasy world. But it soon became apparent that it was simply her way of saying good-bye.

So he sat quietly in his chair, making verbal responses where necessary, and watched as she purged herself of her grief.

The afternoon was nearly gone before she finally fell silent, and for a long time afterwards they sat together in the stillness, looking out the window at the lengthening shadows. What Chrys's thoughts were during that time Jonny never found out; but his own were a slowly flowing river of bitterness and unreasoning guilt. Over and over the whole scene replayed itself in his mind, nagging at him with unanswered questions. Had MacDonald really been crazy with rage, or thinking perfectly clearly? Had he seen the opportunity to take Szintra and Patrusky out simultaneously and acted accordingly? Had he expected Jonny to back him up in his play? *Could* the two of them actually have defeated Challinor's group?

The sound of the front door broke the cycle of recrimination and guilt. "Dad?" Chrys called.

"Yes." Eldjarn came in and sat down next to his daughter. He looked tired. "How are you doing?"

"I'm all right. What's happening in town?"

"Not much." Eldjarn rubbed his eyes. "Mayor Tyler has basically promised Challinor none of us will make trouble. I don't know, though—I've heard a lot of rumblings to the effect that someone ought to do something."

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"That someone being me," Jonny said. "I gather they think I'm afraid to act?"

Eldjarn looked up at him, shrugged uncomfortably. "No one blames you," he said.

"In other words, they do," Jonny said, a bit too harshly.

"Jonny—"

"It's all right, Chrys," Jonny told her. He could hardly blame the others; they didn't know why he'd held back. He wasn't even sure why himself, now. . . . "Orrin, how many men does Challinor have in Ariel? Any idea?"

"At least ten Cobras that we know of, and probably a dozen of those teenaged arrogants manning roadblocks," Eldjarn said.

Jonny nodded. Challinor had said he had twelve Cobras on his side. Add Taber and maybe a couple more, subtract Szintra, and it still looked like nearly all the rebels were now in Ariel. The conclusion was obvious. "They're not ready to move against the Mines yet. So unready that they'd rather try and box up a whole town than move up their timetable. Any guesses as to why?"

For a moment the room was silent. "The miners usually work a two-week shift and then have a week off in Weald, don't they?" Chrys asked. "Maybe Challinor wants to move in during a shift change."

"That sounds reasonable," Jonny agreed. "Depending on how the routine goes, Challinor would hit the mines with either a single shift there or else all three of them. If the former, he has an easier takeover; if the latter, he gets extra hostages, so it makes sense either way." He glanced at his watch. "Three days to go, if they're on a rational system up there. Should be enough time."

"For what?" Chrys asked suspiciously.

"For me to go upriver to the mines and blow the whistle, of course—and I'd better get started right away." He stood up.

"Hold it, Jonny, this is crazy," Eldjarn said. "In the first place, there are forty kilometers of extremely hostile forest between us and them. In the second place, you'd be missed long before you could get there."

Slowly, Jonny sat back down. "I hadn't thought of that last," he admitted. "You really think Challinor will keep such close track of me?"

Eldjarn shrugged. "Despite your . . . um . . . inactivity this morning, you're still the only person in town who can be a threat to him. Your disappearance would certainly be discovered by morning, and I hate to think what desperate steps he might consider it necessary to take. It's a good idea, but someone else is going to have to do it. Me, for instance."

"You?" Chrys looked startled. "That's ridiculous—suicidal, too. Without weapons and with the spine leopards on the move you wouldn't have a chance."

"I have to try," her father told her. "A boat would protect me from all but the most determined spine leopards. And there *is* a weapon still in town that I can take."

"What—Seth Ramorra's machete?" she scoffed.

"No." Eldjarn paused, and Jonny saw a muscle twitch in his cheek. "Ken's antiarmor laser."

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Chrys's jaw dropped. "You mean the one in—Dad! You're not serious!"

"I am." He looked at Jonny. "Is it possible to remove the laser without amputating the leg? That might be too obvious for Challinor to miss."

"It was done once before, during our brief foray into civilian life," Jonny said mechanically. All of MacDonald's Cobra gear available—and he'd never once thought about using it. "Have you talked to Father Vitkauskas about funeral arrangements yet?"

Eldjarn nodded. "It'll be a combined service, for both Ken and Ra Insley, tomorrow at nine in the Square. Most of the town is going to come, I think—and in a crowd that size Challinor would never realize I was missing."

Jonny stood up. "Then we've got to get that laser out now. Ken's body's back there, isn't it? Good; let's go."

As in most frontier towns on Aventine, Eldjarn's job as Ariel's doctor also required him to act as undertaker when necessary, and the modest office/surgery attached to the house included a small room in the rear for preparation of the dead for burial. Leaving Chrys to stand guard in the office, Jonny and Eldjarn went back there.

Laid out on a table, MacDonald's body didn't look any better than it had sprawled in the street, but at least the odor of burned flesh was gone, either dissipated or artificially neutralized. Jonny looked at the chest wound only once, then turned away, concentrating deliberately on the leg. "The laser lies right here, beneath most of the calf muscle," he told Eldjarn, tracing the position lightly on MacDonald's pant leg. "There's probably no scar—I haven't got one—but the last time they took it out the incision line was about here." He indicated it.

Eldjarn nodded. "I see how they inserted it now. All right; I'll get an instrument tray and we'll get started."

The faint sound of footsteps was their only warning. Jonny looked over his shoulder just in time to see the door swing open as L'est and Taber strode into the room, a white-faced Chrys trailing behind them.

"Good evening, Doctor; Moreau," L'est said, giving the room a quick once-over. "I trust we're not interrupting anything important?"

"We're preparing Mr. MacDonald's body," Eldjarn said shortly. "What do you want?"

"Oh, just a little insurance against heroics." L'est glanced over Eldjarn's shoulder. "It occurred to me that perhaps we ought to remove our late compatriot's weapons before someone else took it into his head to do so. If you'll just step aside, this will only take a minute."

Eldjarn didn't move. "No," he said, his tone allowing no argument. "I'm not going to permit you to mutilate the dead."

"You don't have any choice. Move aside."

Eldjarn snorted. "I realize you're new to this warlord business, but if you think you can kill or imprison a town's only doctor and then expect to get even grudging cooperation from the rest of the populace you're in for a very rude shock."

For the first time L'est's confidence seemed to waver. "Look, Doctor—"

"Doctor, would *you* remove the la-

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sers for us?" Taber put in suddenly. "You're a surgeon—you could do it without leaving any marks."

Eldjarn hesitated. "Jonny?" he asked.

Jonny shrugged, trying to hide his disappointment at L'est's rotten sense of timing. "Either you do it or L'est will. I'd rather you did, personally." He impaled L'est with his eyes. "But Orrin's right—we'll have no mutilation. Specifically, we're not going to let you cut off his fingers."

"But the lasers—" L'est began.

"No buts. His hands are going to be in plain sight in the casket."

Taber nudged L'est. "As long as we can confirm the fingertip lasers are still there in the morning, that should do," he murmured. "You can always take them and the power supply out before the actual burial, if you really think it's necessary."

Slowly, L'est nodded. "All right. But if those fingers are missing in the morning we'll hold you responsible, Doctor."

"I understand. Jonny, perhaps you and Chrys would go over to Ken's house and bring me his Cobra dress uniform?"

Jonny nodded. Bad enough that Chrys had had to stand there and listen while MacDonald's body was discussed like a military bargaining chip; there was no need for her to watch as it was cut up as well. "Sure. I think both of us could use a walk. Come on, Chrys."

"Just be sure and stay where you're supposed to," L'est warned. "The roads out of town are closed—and there are Cobras on each barricade."

Jonny didn't bother to reply. Brushing past them, he took Chrys's arm and left.

MacDonald's house wasn't too far away, but Jonny was in no particular hurry, and the house held a lot of memories for both of them to linger over. By the time they emerged with the carefully folded uniform it was dark enough for the brightest stars to be visible. "Let's walk for a while," he suggested as Chrys turned in the direction of home.

"That's not necessary," she said tiredly. "Dad will be finished by now."

"But it's such a nice night," he said, steering her gently but firmly toward the center of town.

She resisted only a moment before falling into step beside him. "You have an idea?" she whispered.

Jonny nodded. "I think so. You have the key to your office with you?"

"Yes . . . but I hadn't gotten very far on my tight-beam transmitter."

"That's okay. Do you have any of those tiny electrical gadgets you can install in a vehicle's control circuits that let you run it by remote control?"

"Radio microrelays? Sure. The miners at Kerseage use them all the time for boring machines and slave-controlled ore barges going downriver—" She broke off. "A boat going *up*river? With a message in it?"

"Keep your voice down—the guy following us might hear you." He doubted it, actually; he'd already confirmed that the tail was one of Challinor's teen-agers, who was much too far back to hear anything except a loud scream. But he wasn't at all sure how Chrys was going to react to the plan that was slowly gelling in the back of his mind and wanted to put that explanation off as long as possible.

They were almost to the edge of the

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Square and within sight of Chrys's shop when she suddenly tugged on his arm. "There's someone standing at the door!" she hissed.

Jonny nudged his vision enhancers up. "It's Almo Pyre," he identified the guard. "With a pellet gun. Challinor's probably worried about you or Nedt putting together something to ungimmick the phone system." Though the fact that Challinor had apparently deployed the bulk of his forces with an eye to keeping anyone from slipping out of town showed how small a threat he considered Chrys's equipment to be. "This shouldn't be too hard."

"What about the tail?" Chrys asked anxiously. "And you're not going to hurt Almo, are you? He's just a boy."

"Who's old enough to face the consequences of his choices," Jonny pointed out. "Oh, don't worry—I like the kid, too. As for the tail, I think a hard right turn around the drugstore here and a little brisk walking will lose him without tipping him off that we were on to him. Then we'll circle around and come up on your shop from behind. Once we move there'll be no talking, so I need some information right now. . . ."

As far as Jonny could tell, the trick worked, and they reached Chrys's building with Challinor's spy nowhere in sight. The rear of the shop, with no door that required guarding, was deserted. Stepping directly underneath the second-floor window Chrys pointed out, Jonny took one final look around him and jumped. His leg servos were more than equal to the task, landing him on the narrow window ledge in a crouched position, knees spread to the sides to avoid breaking the glass and hands finding good purchase on the wooden frame. The window, open a few centimeters for ventilation, slid all the way up with only token resistance. Seconds later Jonny was inside.

The search was short—all the items he sought were right where Chrys had said they were—and within two minutes he was back on the ledge, closing the window behind him. Seconds later he was walking away from the building as nonchalantly as possible. Chrys, at his side, was breathing harder than he was.

"No problem," he assured her, answering her unasked question. "No one'll ever know I was there. Let's get back home—you and your father have a lot of work yet to do tonight."

L'est and Taber had long since left by the time they reached the Eldjarn home, but Jonny knew better than to stay inside too long. Fortunately, explaining what he wanted them to do took less than a minute. Neither Chrys nor her father was especially happy with the plan, but with obvious reluctance they agreed.

He left immediately afterwards, and as he walked down the street toward his own house his peripheral vision caught a glimpse of a shadow detaching itself from a bush near the Eldjarn home and falling into step behind him, somewhat closer than before.

He sighed, and for the first time since MacDonald's death a tight smile flickered across his face. So the gamble had worked: the tail was back on the job, and the absence of nervous Cobras scouring the area indicated the boy had decided that losing his quarry for a few minutes wasn't worth reporting. An understandable reaction, Jonny thought,

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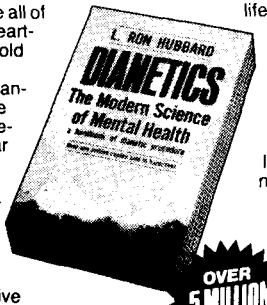

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given the earlier demonstration of Cobra killing power. And as far as he was concerned, the kid was welcome to watch him the rest of the night.

He just hoped Challinor hadn't thought to have someone watch the Eldjarns, too.

The morning dawned crisp and clear, with only a few scaly cirrus clouds to mar the deep blue sky. To Jonny it seemed wrong, somehow, that Aventine's sky should appear so cheerful on the day of MacDonald's funeral and after Jonny's own restless, nightmare-filled sleep. Still, good weather should mean a large turnout at the funeral, and that should draw a lot of Challinor's Cobras. Perhaps Aventine was on his side after all.

Feeling a bit more encouraged, he ate a good breakfast, showered and shaved, and at eight-thirty emerged from his house in full Cobra dress uniform.

L'est and Taber, looking as tired as he felt, were waiting for him. "Morning, Moreau," L'est said, looking him up and down. "Neatest I've seen you since the day of the landing."

"You're too kind," Jonny said shortly. "Now if you don't mind, I have a funeral to attend. I'm sure you have somewhere you have to be, too." He stepped between them and stalked down the street.

They fell into step on either side and a pace behind him. "There are about a hundred places I'd rather be going," L'est said, "and about a thousand people whose company I'd prefer. But Tors seems to think you need someone to hold your leash."

Jonny snorted. "Challinor always did

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have a way with words. What the hell are you afraid of—that I'll start a riot or something at Ken's funeral?"

"There's no point in taking chances," Taber said dully. "So far Ariel's been peaceful, but mass meetings are always potentially explosive. A show of force is the best way to make sure no one gets crazy ideas."

Jonny glanced back at him. "You don't sound thoroughly convinced any more," he suggested. "Challinor's high-handed methods getting to you?"

Taber was silent for several steps. "I liked MacDonald, too," he said finally. "But Challinor's right—the government here *isn't* working."

"There are ways to improve it that don't involve rebellion—"

"That's enough," L'est interrupted. "The time for talking politics is over."

Jonny clamped his jaw tightly, but he really hadn't expected any other reaction. L'est wasn't going to just stand quietly and let him sprinkle extra water on the seeds of uncertainty that Taber was beginning to show. But maybe—just maybe—there was enough there already for them to sprout on their own. Whether they would do so in time was another question entirely.

Not since the last Landing Day festival had Jonny seen the Square so crowded. In the center, resting on two waist-high stands, were the open coffins; from the edge of the Square MacDonald's face and folded hands were just visible. Between the coffins, sitting on the only chair in sight, was Father Vitkauskas. Without pausing, Jonny turned to his left, circling the crowd until he was standing in a line with the foot of MacDonald's coffin. Looking around, he spotted at least six more of Challinor's Cobras grouped loosely together on the fringes of the crowd near him, their positions obviously having been chosen to take advantage of the slight rise there that would permit a better view of the area. Apparently Challinor really *was* worried about trouble with the crowd.

"Good morning, Moreau," a voice murmured behind him. Turning, Jonny saw Challinor step up next to L'est. "A good turnout, wouldn't you say?"

"Very good," Jonny said coldly. "Ken was a very popular person. Killing him was probably one of your biggest mistakes."

Challinor's gaze flicked over the crowd before returning to Jonny. "I trust you won't be foolish enough to try and take advantage of that," he said, with the faintest edge to his voice. "L'est, Taber, and I will be standing behind you the whole time, and if you even look like you're about to make trouble it'll be the last thing you ever do. *And* possibly the last thing some of these other people do, too." He glanced significantly at the Cobras standing to either side.

"Don't worry," Jonny growled. "I have no intention of starting anything."

Abruptly, the low murmur of conversation in the Square faded into silence. Turning back, Jonny saw Father Vitkauskas had risen to his feet.

And the funeral began.

Jonny remembered afterwards very little of what was said that morning. He sang mechanically with the other people when necessary, and bowed his head at the proper times . . . but mostly his attention was on the crowd, picking out

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those people he knew best and trying to gauge their mood. Chrys and her father he found easily, standing in the front row a quarter of the way around the circle from him. Mayor Tyler was near them, looking grimly dignified, a man determined not to show his shock at the sudden inverting of his world. A lot of the people were wearing that same expression, Jonny noted, and he could hardly blame them. The Cobras, their helpers and protectors, had seemingly turned against them, and no one was quite sure how to react. Some showed more uncertainty than others; Jonny noticed Almo Pyre shifting uneasily from foot to foot. Like Taber, the teen-ager seemed to be having second thoughts about the side he'd chosen.

A sudden rustle of cloth brought Jonny's attention back to the priest. The service was drawing to a close, he saw, and the crowd was kneeling for the final prayer. Hastily, Jonny dropped to his knees, glancing around as he did so. Challinor's Cobras were still on their feet, whatever feelings of respect they might have had overridden by the tactical necessity of keeping close watch on the crowd. Out of the corner of his eye he saw Almo hesitate and then, with a glance in Jonny's direction, kneel with the rest of the people around him. Between the coffin stands Father Vitkauskas had himself knelt . . . and as he began the requiescat, Jonny's eyes sought Chrys, saw her hand slip under the hem of her long skirt to the device strapped to her leg. . . .

And MacDonald sat up in his coffin.

Behind Jonny someone gasped—but that was all the reaction anyone had time for. MacDonald's hands unfolded themselves, settling smoothly down into what looked like the ready position for a double handshake . . . and the lasers in his little fingers abruptly spat flame.

Taber, standing directly in the line of fire, crumpled without a sound. Challinor and L'est, their programmed reflexes finally breaking them free of their astonished paralysis, dodged to either side, raising their own lasers to counterattack. But MacDonald's forearms were already swinging rapidly to his sides, sweeping twin fans of death over the heads of the kneeling crowd. L'est made a choking sound as the beam caught him across the chest and he fell, lasers still firing uselessly at the man he'd already killed once. Challinor broke off his own attack barely in time to duck down—and fell all the way to the ground as Jonny's antiarmor laser flashed. The rest of the Cobras around the Square, their reflexes already keyed to the futile task of stopping MacDonald's attack, reacted far too slowly to Jonny's entry into the battle; many, in fact, probably never realized anyone else was shooting at them until it was too late. Between MacDonald's wild spray and Jonny's more accurate sniping, they made a clean sweep.

It was over before anyone in the crowd thought to scream.

"We're not going to be able to keep this secret, you know," Mayor Tyler said, shaking his head. His hands were shaking, too. "If nothing else, we—and about a quarter of the towns in Caravel District, for that matter—are going to have to ask the governor-general for new Cobras."

"That's okay," Jonny said, wincing

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slightly as Eldjarn applied salve to his shoulder, where a near miss had burned him. "No one's going to try and avenge Challinor or pick up where he left off, if that's what you're worried about. All the fence-straddlers he said he had standing by will be moving like crazy to make sure they come down on the right side. The warlord movement is dead." He cocked an eye at the mayor. "You just make sure your report shows that only a very small minority was involved in the plot. We can't have people getting paranoid about us—there's still too much work on Aventine that only Cobras can do."

Tyler nodded and moved toward the door to his private office. "Yeah. I just hope Zhu doesn't take the whole thing wrong. I'd hate for Ariel to get stuck with the blame for Challinor's ambition."

The door closed behind him, and Chrys stood up. "I suppose I'd better go, too—I've got to get busy fixing the phone system."

"Chrys—" Jonny hesitated. "I'm sorry that had to be done at Ken's funeral, and that you had to . . . to see all of that. . . ."

She smiled wanly. "That extra damage?" She shook her head. "Ken was long gone from that body, Jonny. He couldn't feel those lasers. *You* were the one I was worried about—I was scared to death you'd be killed, too."

Jonny shook his head. "There wasn't really much danger of that," he assured her. "You, Orrin, and Father Vitkauskas set things up perfectly for me. I just hope Ken's reputation doesn't . . . I don't know."

"It already has," she sighed. "The rumors are already starting to travel out there, to the effect that Ken was faking death so that he could get in one last shot."

Jonny grimaced. Yes, that *would* be what they thought—and within a few days and a hundred kilometers that story would probably be bent completely past recognition. The Avenging Cobra, perhaps, who'd returned from the dead to defend his people from oppression? "A legend like that might not be all bad, though—it ought to at least slow down future Challinors," he murmured, thinking out loud. "I don't think that's something Ken would dislike having attached to his name."

Chrys shook her head. "Maybe. I can't think that far in the future right now."

"You sure you really feel like working?" he asked, studying her strained face. "Nedt could start the phone repairs alone."

"I'm all right. It'll be good therapy, I think Dad would say." She reached for Jonny's hand, squeezed it briefly. "I'll see you later, Jonny—and thank you."

She left, and Jonny sighed. "The real thanks goes to you two," he told Eldjarn. The reaction was beginning to hit him, and he suddenly felt very tired. "I don't think I could have faced having to wire all those sequential relays to Ken's servos, even if I'd known how to do it. It must have been pretty hard on Chrys, especially."

"We all did what we had to," Eldjarn said obliquely. "You know, though, that it's not over yet—not by a long shot. Zhu's going to react to this, all right. If he's smart, part of his reaction

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will be to start listening to what Cobras have to say on governmental policies and procedures. You'll need to take advantage of the opportunity to offer some good, concrete suggestions."

Jonny shrugged wearily. "I'm like Chrys: I really can't think that far ahead right now."

Eldjarn shook his head. "Chrys can get away with that excuse; you can't. As long as there are Cobras on Aventine, the threat of something like this happening again will always be with us. We have to act *now* to make sure that possibility stays small."

"I wouldn't even know how to start something like that."

"We start by making the Cobras feel that an attack on the government is an attack on them personally," Eldjarn said. "Ken fought Challinor because the rebellion was an attack on his family pride; you probably had similar reasons." He hesitated. "For most of you, I suspect we'll have to appeal to enlightened self-interest . . . once your self-interest has been properly linked with the government's."

Jonny frowned as understanding began to come. "You're suggesting we be brought directly into the government somehow?"

"I think it's inevitable," Eldjarn said; and though his voice was firm his restless hands indicated his uneasiness. "You Cobras have a lot more of the power on this world than the system has taken into account, and one way or another the system has to adjust to reflect that reality. We either give it to you in a controlled, orderly way or risk the chaos of Challinor's method. Like it or not, Jonny, you're an important political force now—and your first political responsibility will be to make sure Zhu understands that."

For just a second Jonny grimaced at the irony. Perhaps, in a small and unexpected way, Challinor had won after all. "Yes," he sighed. "I guess I'll have to." ■

● Consumption is the sole end and purpose of all production; and the interest of the producer is attended to, only so far as it may be necessary for promoting that of the consumer. The maxim is so perfectly self-evident, that it would be absurd to attempt to disprove it. But in the mercantile system, the interest of the consumer is almost constantly sacrificed to that of the producer; and it seems to consider production, and not consumption, as the ultimate end and object of all industry and commerce.

Adam Smith, *The Wealth of Nations,* 1776

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Jay Kay Klein's biolog

Brad Hamann

It's not only the writers of science fiction who usually have a genuine affection for the field and find the editors highly supportive. Artists as well delight in the imaginative freedom allowed by science fiction art directors. Brad Hamann started reading science fiction when he came across a Lester del Rey story at age nine. In 1978 his first science fiction illustration was published in a now-defunct magazine, the same year he started doing interior art for *Analog*.

Brad moved at the beginning of this year from New York City—where he had lived all his life—in an experiment to see whether life in a small community would permit more concentration on art. He had been graduated from the city's premier high school, Stuyvesant, noted for its emphasis on science and mathematics. However, he had always loved art, and attended first New Paltz State College as a fine arts student, then transferred to Parsons School of Design, where he received a B.F.A. with honors. He has since studied with a series of noted illustrators.

His work has appeared in The New York *Times*, *Science Digest*, *Scholastic*, *U.S. Air*, and *Business Week*, among a variety of magazines, and has been commissioned by advertising agencies. More and more, though, he has been illustrating science fiction book covers. Like a handful of science fiction artists before him, he also likes writing science fiction, and is trying his hand at it. (As a note to anyone who wonders whether someone can master both disciplines, there is always the example of Harry Harrison, who switched completely from art to writing.) One book already written and illustrated, reviewed in *Isaac Asimov's Science Fiction Magazine* by Baird Searles last year, is *The Science Fiction Design Coloring Book*.

Aside from a long-time acquaintance with science fiction, Brad has two other enthusiasms that make for reader satisfaction. He never remains content with older techniques already mastered, but continually studies from wide-ranging sources and always strives to produce illustrations that form an esthetic whole. Thus, each illustration he turns out is unique and as beautifully composed as his continually expanding capabilities permit. One thing he deplores is seeing various illustrators churn out endless and lifeless replications in the style of some of the leading science fiction artists. Another is busy illustrations, each detail of which is good by itself, but which fail to mesh into an overall pleasing pattern.

Brad is determined his work in *Analog* will never suffer these defects. What he will come up with in the future not even he knows, but it will be different and evolving with science fiction itself. ■

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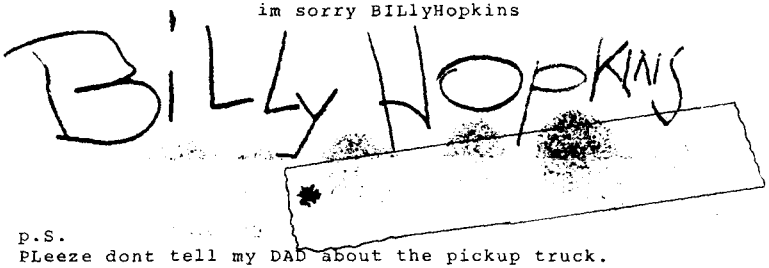
DEer, Mister
Presadent.

i got your adress from my history teecher. He says
im a brat. this is my fathers typeriter. Hes at work
at the mill. i am using it becose my handriting
stinks.and becose i saw you on the tv and you
were reel mad.
i go to greentree elementery school in GReentree, Penn.
we live next to the big city of Pittsberg Penn. you
can see the hole city from the big hill behine
our house.
i wood not be riting this letter to you if the Pittsberg
STEelers had won the super bole game last week. That
got me reel mad.
ANyways,... .last week i saw a big brite rond thing
land in the field behine our house, behine the
barn, next to the chiken coop. MOM & Dad had gone
to town to shop and i was scarred stif.
IN a little wile it took off. strate UP. reel fAST.
Me and my dog BOb went out to see if it had hert
anything. The grond was all burnt & smokylike allover.
i found a flashlite on the grond ware it had landed
and took off. Strate UP. reel fast.
Wen i shined it at a chiken it got reel small and the
other chikens ate it. Wen I shined it at BOb he got
reel small to and the chikens ate him to. i gess i
pushed down too hard on the red button or something.
Wen MOm & DaD got home i hid behine a tree. after
they went in the house with the grosseries i shined
the lite on my dads pickup truck. it made it reel
reel small and i put it in my poket and watched the
superbole game on tV with my dad. THe Pittsberg
STeelers lost 27to3 and i got reel reel mad at them
so i ran up to the top of the big hill behine our
house and did it.
IM sory mr, PREsadent i did not meen to get you
so mad and all your Genrals and solgers and the
Govner and everybody.
MY DaD says i have to give it back..,.. So you can
find the hole beutyfull city of Pittsberg, Penn.
under that peese of Scochtape on the bottom of
this letter.

im sorry BILlyHopkins



p.S.
PLeeze dont tell my DAD about the pickup truck.
HE thinks somebody stole it.thanks BIllyHopkins!

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Search for Terrestrial Intelligence

M. David Stone

Science demands objectivity—but that's not always easy to achieve in practice when the subject matter strikes close to home.

The scenario is a familiar one.

A survey ship lands on an alien planet. By all indications, the planet seems perfect for colonization. The atmosphere is breathable, the local flora and fauna are digestible and, by happy circumstance, the few local carnivores are easy to deal with. But before the survey team can set up transport booths and start bringing in colonists, they need an answer to one additional question, namely: Is there intelligent life on this planet—some species that must be regarded as *persons* and is therefore entitled to all the legal rights accorded to other persons—like *Homo sapiens*, for instance?

The problem is that there may be such a species.

Just to keep things interesting, there's

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Does this member of a primitive culture qualify for personhood? According to some animal rights advocates, the evidence says yes.

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an added complication. The candidate species is not clearly and unarguably entitled to personhood, but a borderline case. It has no technology to speak of, no clearly demonstrated language, and nothing that can reasonably be called a social system. What it does have are some limited tool-making abilities, a definite social protocol, an undeniable sense of self, a primitive "culture" in the sense that it transmits knowledge from one generation to the next *through teaching* and, possibly, some language abilities—though the evidence for that is just ambiguous enough to be subject to question. Some members of the crew think they see evidence for a crude sense of humor and even an esthetic sense.

Individually and collectively, the survey team takes its ethical responsibilities seriously. Its members are truly interested in finding and protecting sentient species. But they are also interested in finding new planets for their own species; population pressure demands a larger resource base. It is in borderline cases like this that the ethics of both the crew and of society in general are put to their most severe test.

And it is in borderline cases like this that the operational definition of personhood becomes critical to the protection of a species.

What happens next, of course, is the interesting part of the story. Members of our survey team battle each other, the newly arrived colonists, and the bureaucracy back home, with Our Hero trying against all odds to establish the personhood of the candidate species.

In the end he succeeds, and with that the problem is solved. All questions about the species' status are resolved, the planet is put off limits to colonization and the survey team takes off, looking for another planet.

The end.

Well, it makes a nice, upbeat story. At least, there are no loose ends or unanswered questions left to bother us.

Except this: What, exactly, are the requirements for personhood? What tests must an ET species pass before it is entitled to the rights of persons?

And this: Did you notice a dichotomy built into the assumptions behind the scenario? The candidate species is "borderline," yet the scenario assumes a sharp cutoff. The species either *is* composed of persons or it is *not*. It either will get the full protection granted to persons or none at all.

Why is there no middle ground?

These may not seem terribly important questions for a story, but then I'm not really all that concerned about a story.

What I am concerned with is present reality.

I am concerned because I think that the species I've just described very likely does deserve special rights. The problem is, I have not just described some hypothetical extraterrestrial species. I've just described a very real terrestrial species.

In fact, if you replace the concept of colonizing an alien planet with the idea of encroaching on wild habitat, the above scenario becomes a straightforward description of current reality.

And the species I've just described is the chimpanzee.

* * *

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Very well. Do chimpanzees deserve special rights? Are they and the other great apes really "persons"?

The answer to that just may be yes. At least, some people think so.

Over the last several years there has been a small but growing movement for something called "animal rights." Briefly, the idea is that all animals deserve certain rights, and that certain animals—other than man—deserve special rights. This movement has two aspects particularly worth noting.

First, it is a movement that includes a number of *scientists*—researchers in the field.

Second, it is a highly emotional issue, which appears to have little or nothing to do with evidence, logic, or questions of fact. With few exceptions, individuals either agree that there are ethical adjustments to be made in our treatment of certain animals or they don't want even to consider the possibility.

All well and good, but . . . human rights for chimpanzees? What is this movement all about? What's the logic behind it (if, indeed, there is any)?

What is the argument for claiming that chimpanzees deserve *any* of the rights usually reserved for humans?

Are the people behind this movement being irrational, falling into the trap of anthropomorphizing chimps and other great apes?

Or is it the opponents of the animal rights movement who are being irrational, refusing to accept reality?

The animal rights movement was sparked largely by a series of language experiments with chimpanzees and other apes. These same experiments led to a raging debate over whether chimpanzees can or cannot learn language. What is particularly interesting about this debate is that it too—like the question of animal rights—is a highly emotional issue that appears to have little or nothing to do with evidence, logic, or questions of fact.

This is not to say there is no evidence available, for there certainly is.

In the first place, the great apes are man's closest relatives, evolutionarily speaking. The similarities between the species are striking at all levels, from body structure right down to the level of the DNA. In particular, the structure of the ape brain and the structure of the human brain are essentially the same, differing primarily in size. Recent evidence indicates that the chimpanzee brain, at least, even shares the asymmetry, or lopsidedness, of the human brain, with one hemisphere—usually the left in humans—tending to be larger than the other.

In humans, this asymmetry appears to be associated with language. The presence of the same asymmetry in the chimpanzee raises the interesting possibility that there is a physiological basis for expecting the chimpanzee to have some language abilities. But then, interesting possibilities are a far cry from hard evidence, and the fact is that, until relatively recently, all attempts to teach language to apes were total failures.

Total failures, that is, until June 1966. That was when R. Allen Gardner and Beatrice T. Gardner began their by now well known experiment with a young female chimpanzee named Wa-

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shoe. The experiment used American Sign Language, or Ameslan, as a medium of communication.

Notice, please, the word *communication*. Notice also that there is no question that non-human animals communicate—both with members of their own species and with members of other species, including humans. A zebra, upon noticing a lion, has no trouble communicating to other nearby zebras that they've reason to leave the area. A rider on horseback has no trouble letting his mount know whether to trot, canter, gallop, or stop. My dog has no trouble letting me know that she wants to go out or come in.

The experiment with Washoe—and other experiments with other apes — differ from these examples of communication in only one important respect: these experiments use *language* as the medium of communication.

There is no question in these experiments that there is communication taking place between man and ape.

There is no question that the communication is taking place through the medium of language.

The question is, whether the apes are learning language in the same sense that humans learn language.

In 1969, when the Gardners published the report of their early results, they carefully avoided the issue of whether Washoe had learned language, on the grounds that they could find no generally accepted definition of what language was. They claimed only that Washoe had *used* language.

Meanwhile, in 1967 David Premack had started teaching another chimpanzee, Sarah, a language that he had devised. Premack's language used plastic tokens for words. This made it easier to avoid the problem of reading something into the ape's movements and, at the same time, made it easier to test whether an ape could learn to use language syntactically.

Duane Rumbaugh and Sue Savage-Rumbaugh also began a series of language experiments. Like Premack, the Rumbaughs invented their own language for the purpose—Yerkish. In Yerkish, visual symbols representing words were punched into and read by computer. This went Premack's language one better in avoiding the problem of reading something into the chimps' movements. The computer, unlike a human, has no choice but to be objective.

In these and a few additional experiments, researchers began by testing for—and finding—some very specific, very limited abilities. In each case these were abilities that only man was thought to have. In each case the apes showed that they had the same abilities, to some minimal extent, at least.

One example: Sarah, Premack's star chimp, loved chocolate. Premack made use of this in several ways—in one case presenting her with the sentence "Brown color of chocolate" with no chocolate in sight. Later he gave her four colored disks with the instruction to choose the brown disk—again, with no chocolate in sight. She chose the brown one.

In doing that, Sarah demonstrated something called displacement—the ability to think of things that aren't present.

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Apes weren't supposed to have that ability. In fact, displacement—which is considered essential to language—was supposed to be a uniquely human ability.

In addition to reports of this kind of testing, though, researchers were also reporting some extremely sophisticated uses of language. The apes, it seemed, were (and still are) using language creatively—to lie, curse, create compound words, make puns, and make jokes. In many ways these reports are much more impressive than the reports of carefully controlled experiments, but they are also much more open to error. In particular, they are much more open to the possibility that the researcher is reading something into the ape's behavior. Indeed, there has been a great deal of questioning by skeptics.

Of course, a skeptical review of the evidence is expected in science as normal and even desirable. Evidence that can't stand up to close scrutiny is worthless. Evidence that can stand up is most probably correct. What is not normal, however, is for the discussion to become highly emotional in tone—at least not *this* emotional.

One measure of the level of emotion on this issue is that the debate over the evidence has gotten nasty. Some scientists (read: people who presumably should know better) have made critical statements about the ape language experiments which resound with echoes of "Don't confuse me with the facts; my mind's already made up." They've made those statements, moreover, while simultaneously accusing the language researchers of doing the same thing—ignoring the facts. Some of these critics (read: credentialed, legitimate scientists) have even gone so far as to attack the ape language researchers (again, credentialed, legitimate scientists), with a vehemence usually reserved for a Velikovski or a von Däniken.

The response has been just as strong.

Consider, for instance, what happened at the Clever Hans Conference held by the New York Academy of Sciences in May 1980. To begin with, there was the conference itself. Its title was Conference on the Clever Hans Phenomenon: Communication with Horses, Whales, Apes, and People.

Clever Hans, in case the name isn't familiar, was a horse which lived in Germany at about the turn of the century. His trainer had apparently taught Hans how to communicate in German, in a clumsy way, by tapping out numbers with his hoof to represent letters, thereby spelling out words and sentences. Hans could not only talk, it turned out; he could also perform simple mathematical calculations—addition, subtraction, and so forth.

For a short time, Hans was hailed as proof that a horse could reason and communicate in a human way. Then his trainer made an even more phenomenal discovery. Hans was telepathic also. He could answer questions that hadn't even been asked yet.

A close look at the facts, though, hinted that Clever Hans's cleverness was somewhat overrated. It turned out that when the trainer didn't know the answer to a question, neither did Hans. Careful study showed that Hans's talents lay not in the realm of rational

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thought, but in the realm of extremely refined perception. He was producing the correct answers not because he understood the questions, but because he had an impressive talent for picking up extremely subtle cues given unconsciously by his trainer.

Of course, today the Clever Hans phenomenon is well known among psychologists, and good experimental design routinely guards against it when working with any kind of animals — including people. The story of Clever Hans is so well known, in fact, that it is found in text books for introductory psychology courses; it is the classic demonstration of the need to guard against inadvertent cuing of subjects.

So much for Clever Hans. Except that, to invoke the Clever Hans Phenomenon as the title for a conference centering on ape language experiments is immediately to summon a faint haze of the disreputable. It's hard to see how the researchers involved can take that as anything *but* a direct insult to their professionalism.

Nor was this an isolated insult. It is representative of much of the criticism before, during, and since the conference, a great deal of which hasn't even been based on research reports, but on popular accounts of the work. The researchers complain that the critics often don't bother to check the facts with them before making their criticisms. As Duane Rumbaugh put it, "One of the many reasons to question the credentials of some skeptics is to note the degree to which they draw upon what is argued in secondary references, authored in the main by non-scientists, and the degree to which they selectively report only the negative conclusions. . . ."

Much of the debate, in fact, reads less like a reasoned scientific discussion than like a knock-down, drag-out fight between individual researchers and critics. At the Clever Hans Conference that fight focused on a personal battle between Thomas Sebeok on the one hand and Duane and Sue Savage-Rumbaugh on the other. Sebeok is one of the chief critics of the ape language research. He was also one of the organizers of the conference. The Rumbaughs are among the leading researchers in the field.

Sebeok had left an earlier convention of the Southeastern Psychological Association before Sue Savage-Rumbaugh gave her paper. At the Clever Hans conference Duane Rumbaugh and Sue Savage-Rumbaugh made pointed references to this fact.

Said Duane Rumbaugh, ". . . had Sebeok attended the entirety of the . . . convention . . . he would have learned of data which gives us good cause to conclude that, indeed, for our apes the symbols are referential, representational, and communicative in value."

Said Sue Savage-Rumbaugh, "I am obliged to present to the Academy not data, but a response to the Sebeok critique. I would rather present data—as I did recently at the SEPA symposium in Washington, where Sebeok left before my paper, but regretfully accept the fact that the first organizer of this symposium is not interested in data, only rhetoric."

She went on to give an item-by-item

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rebuttal to Sebeok's paper, but not before she had pointed out that the paper was "replete with errors, both technical and logical" and that the major problem with it was "in the vituperative criticism which is lacking in both accuracy and internal consistency."

Responding to the accusation of Clever Hans, Rumbaugh said, "Contrary to the allegation made by a prime mover of this meeting of the Academy (Sebeok) the *conclusion* really is not that Clever Hans has confounded each and every contribution to the data base. Rather, the *question* should be, has Clever Hans been held properly at bay when the researcher goes about obtaining the critical data in test situations?"

And in a comment clearly aimed at Sebeok, he said, "We are not at all reluctant to initiate discussion of our methods and the bases for our conclusions with any skeptic. How *long* we will sustain that discussion, however, is determined by the following: (i) Has the skeptic studied the research reported; (ii) Does the skeptic . . . give us reason to believe that s/he is educable or, is this skeptic so persuaded by his or her own rhetoric as to be deaf to the dialogue?; (iii) Has the skeptic . . . taken the opportunity to gain information through such things as invitations extended to visit a laboratory, to participate in prior discussions and to use letters and phone calls to seek clarification? To the degree that such opportunities are sidestepped . . . and are instead surplanted by calls to the summit of this Academy, there is reason to question the motivations behind the skepticism. . . ."

As you might expect from this quote, Sebeok has done none of the above—at least, as far as Rumbaugh is concerned.

At the very least, Sebeok has, according to Rumbaugh, repeatedly refused invitations to see the Rumbaughs' laboratory or even to view videotapes. Sue Savage-Rumbaugh points out that "told of a recent study in which Sherman and Austin (two chimps) were videotaped . . . he (Sebeok) refused to view this unedited tape, stating that the camera angle would render the work unacceptable (though he had no idea of the camera's position nor the scope of the picture)."

Sebeok, for his part, made references to "wasted money" and tied that reference to vague threats about "people in Washington" who were "looking into" the situation.

These examples, I think, do a good job of representing the tone of debate both at this conference and on this issue in general. It is clearly not the disinterested, intellectual exercise that science occasionally pretends to be.

Add it all up, and you begin to see the level of emotion surrounding the issue.

For those of us sitting on the sidelines, this debate has been interesting to watch—especially for those of us who are fascinated by the question of how science really works—but it may be time to step back and ask what is really going on. After all, "vituperative criticism" is not science as usual. Going after someone's research grants is not science as usual.

What's all the (occasionally literal) shouting about?

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The answer, in part, is that there is a streak of species chauvinism in *Homo sapiens* which runs extraordinarily deep.

To leave apes for a moment, consider this statement taken from a book on the bottlenosed dolphin by David and Melba Caldwell.

"Dolpins probably are just exceptionally amiable animals with an intelligence now considered by most workers, on a subjective basis, to be comparable to that of a better-than-average dog. *We think this is about as complimentary a statement as can be made about any mammal* (italics added)."

This may be one of the sillier statements of all time. When I first ran across it, I had two immediate reactions.

What, I wondered, would the Caldwells say about the logical deduction that flows from this pronouncement, namely:

This statement is, by their own admission, the best that can be said of any mammal.

David Caldwell and Melba Caldwell are mammals.

Therefore, by their own admission, the most complimentary thing that can be said of the Caldwells is that they are exceptionally amiable animals with intelligences comparable to that of a better-than-average dog.

Of course, this is a nit-picking kind of reaction. My second reaction was a bit more forgiving. David Caldwell is a former curator and director of research at Marineland of Florida. Melba Caldwell is a former assistant curator and associate director of research. Earlier in the same paragraph they had pointed out that "much of the recent popular literature on dolphins tends to portray them as 'little men in wet suits.' A lot of attention has been centered on the notion that dolphins are as smart as some men, or smarter than most, or that they can talk but that we humans are just too stupid to understand them."

I immediately gave the Caldwells the benefit of the doubt. This sloppy thinking on their part must have been a momentary lapse, I thought, brought on by several too many tourists at Marineland who had taken the TV show "Flipper" much too seriously ("No one you see/is smarter than he.").

It is now six years later. My first reaction still stands; this *is* one of the sillier statements of all time. My second reaction does not. It may be that I'm still nit-picking, but consider just how large a nit this is.

David Caldwell, it says here on the book jacket, is a marine biologist with a Ph.D. from the University of Florida. Melba Caldwell holds an MA in zoology from UCLA. Now, it is conceivable that at the time they wrote this statement the Caldwells were unaware that from 1913 to 1917 Wolfgang Kohler had studied chimpanzees and established that chimps are substantially more intelligent than the better-than-average dog. It is even conceivable that they were unaware of more recent experiments that established the same point. But it is absolutely inconceivable that either of them was unaware than man is a mammal.

Somehow, though, they had managed to compartmentalize their knowledge to

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the point of making this absurd statement.

Worse, the statement comes immediately after a sentence that contains no fewer than four carefully worded hedges ("Dolphins (1) *probably* are just exceptionally amiable animals with an intelligence (2) *now considered* (3) *by most workers* (4) *on a subjective basis* to be comparable to that of a better-than-average dog.") So if we judge by context, we have to conclude that the Caldwells wrote this absurdity while they were trying to be extremely careful in saying precisely what they meant to say.

And yes, of course I know what they meant, but that doesn't change the reality of what they said.

I am convinced that this was not a momentary lapse on the Caldwells' part or a purposeful exaggeration growing from irritation with a too-gullible public.

The Caldwells' statement is a typical example of a particular attitude. That attitude stems from a belief system which holds that *Homo sapiens* is somehow divorced from the rest of the animal kingdom.

It is an updated creationist view of the world.

One of the reasons I've come to this conclusion is that I've quoted the Caldwells' statement to a number of people—in and out of the field of animal research—and have invariably gotten one of two reactions. People either see the logical absurdity immediately, without my having to point it out, or they don't seem to see it at all.

What I find even more interesting, though, is that even after I've led them through the logical deduction that flows from the statement, the second group of people *still* doesn't get the point. A typical reaction for this group is a shake of the head, a shrug, and a "So what?"

This second group of people knows that humans are mammals, all right, but on some level they just don't seem to *believe* it. And please note that the word "mammal"—unlike the word "animal" —cannot be used legitimately as a synonym for "non-human"—at least, not according to my dictionary.

Not too surprisingly, I've found very close to a 100 percent correlation between those who do not see a logical flaw in the Caldwells' pronouncement and those who are fighting hardest to bar chimpanzees from being admitted to the sacred halls of language.

So what's going on in this debate over the ape language experiments?

The answer, I think, boils down to this: We are dealing not so much with an argument over the evidence, but an argument over the framework to use in interpreting the evidence. We are dealing, in fact, with a clash of world views—a conflict of two wholly incompatible belief systems.

Either you believe that man is unique, special, and completely divorced from other animals, or you don't.

Either you fully accept man as part of an evolutionary continuum, on every level, or you don't.

Within either of these belief systems there is room for variation, but there is no middle ground. And the gap between them is immense.

That's part of what's going on: belief systems cannot be shaken very easily

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by logic, and not at all by mere fact; therefore the shouting.

But there's more.

Few people have noticed it yet, but we appear to be in the early stages of a full-fledged scientific revolution—one of those rare occasions where, if the evidence proves convincing enough, we will be forced into a drastic revision of world views, a revision accompanied by a dizzying change in perspective.

At stake is precisely the "updated creationist view"—the idea that there is an enormous gap between man and animals.

A few researchers are challenging that assumption, trying to change the question from "What makes man unique?" to "*Is* man unique?" The answer, they suggest, is that man is not unique in any important way; that the gap between man and other animals is more apparent than real, a difference in degree rather than a difference in kind. Quite simply, they are trying to scrap the image of an enormous gulf separating man from animal and replace it with the image of a continuum in which man is simply located at one end, hand in hand, as it were, with the chimpanzee.

From this view flows the acceptance of the idea that animals have emotion, thought, and even language—an acceptance, in short, of the idea that animals have minds. And rights—*moral* rights.

Unconvinced? Then consider this.

I started with a science fiction scenario. The irony I was getting at, of course, was how much better off the chimpanzee would be if it *were* an extraterrestrial species. There's more to this observation than you may realize.

Now that SETI and the discussion of ETs themselves has become a reasonably respectable field for scientific speculation, all sorts of people seem to be getting in on the fun. The discussion used to be confined to astronomers and biologists. Now it includes theologians, philosophers, and anthropologists, as well.

One of the more interesting aberrations in logic appearing in those quarters is the fear that we will somehow exploit and destroy whatever extraterrestrials we find. Of course anyone who worries about how we are going to treat some problematical ET is far off the mark. In fact, at this stage in our development, any ETs we run into are going to be very much more advanced technologically than we are. If we must worry along these lines, then, we should be worrying how *they* are going to treat us, not the other way around. Still, this particular aberration may yet turn out to be productive, in an unexpected way.

At least one philosopher, Michael Tooley, has made a serious attempt to define personhood as a first step in deciding how one "ought to treat" ETs. In his essay, "Would ETI's Be Persons?", Tooley takes on the difficult task of suggesting tests that an extraterrestrial species must pass before it can earn the right of personhood.

Tooley begins by asking what personhood is and by challenging what he terms "one popular suggestion," namely, ". . . that it is rationality, or the capacity for thinking, that transforms a merely conscious being into a

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person." Tooley doesn't like that idea. "What counts as thinking?" he asks. "Does one have thinking wherever one has 'insightful learning'? . . . If so, chimpanzees are certainly capable of thinking, and thus we must say, on the present suggestion . . . that chimpanzees are persons and that it would accordingly be seriously wrong to kill them."

Tooley, of course, brings up the idea that chimps are persons only to show how absurd it is to base personhood on the presence of rationality alone. After all, we all know that there is no sense in which chimpanzees can be considered persons, don't we?

Tooley clearly thinks so, at least. Having brushed aside the suggestion that rationality equals personhood, he goes on to establish his own criteria for personhood, never mentioning chimps again.

There is a problem, though.

As best as I can tell, Tooley ends up with criteria that *still* include chimpanzees, orangutans, and gorillas. At the very least, he fails obviously to exclude them.

Briefly, Tooley suggests that what transforms a merely conscious being into a *person* is self-consciousness, which he defines as "one's awareness that one is a self." But various experiments have demonstrated that chimpanzees, for instance, can recognize themselves in mirrors, in photographs, and even on videotape—a clear indication of self-awareness.

Tooley suggests further that something is a person, "in a morally relevant sense . . . if and only if it is a continuing subject of experiences and other mental states that can envisage a future for itself and that can have desires about its own future states." But there are some indications the great apes can do just that. In fact, a recent controversy centered on just that possibility. Nim, an Ameslan-using chimp, was sold to a biomedical research facility to be used in hepatitis research. Nim reportedly disliked his new housing—a small lab cage—and asked to be let out. The significance of his request is subject to debate. The point, though, is that it is *at least* possible that Nim was declaring his desire about his own future state.

Even more intriguing are rumors in the research community of one researcher who claims to have had conversations with an ape about that ape's previous life in the jungle. The ape in question reportedly remembers the jungle fondly, and would much rather be there than in a laboratory. Granted, this is only a rumor. It has yet to be reported in a serious scientific journal, much less confirmed; but again, it shows how Tooley's criteria for personhood may very well include the great apes.

All of which brings us back to the problem we started with.

Tooley, of course, is unaware that there is a problem. It's an understandable blind spot. Like most of us, he starts with the assumption that—on Earth, at least—man is unique, differing from other animals not just in degree, but in kind. Given that assumption, it's a foregone conclusion that he will write off all nonhuman terrestrial species even while worrying about protection for some problematical extraterrestrial spe-

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cies. Considering that Tooley's world view is the norm for the overwhelming majority of mankind, the oversight is not only understandable, it is all but unavoidable.

Yet the fact remains that the standards Tooley sets for personhood still seem to include the great apes.

And that fact alone is worth a great deal of thought. ■

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Tooley, Michael. "Would ETI's Be Persons?" *Extra-Terrestrial Intelligence: The First Encounter*. Buffalo, N.Y. Prometheus Books, 1976.

The book contains at least two other essays that make interesting reading in terms of the premise that the great apes are candidates for personhood: "The Discovery of Extraterrestrial Intelligence: A Religious Response," by William Hamilton, and "The Abdication of Human Intelligence," by Ronald Smith.

In April, 1980, the International Whaling Commission held a meeting entitled "Cetacean Behavior, Intelligence and the Ethics of Killing Cetaceans." As with the Clever Hans Conference, this meeting can be viewed as a skirmish of two groups of scientists with wholly different views of reality. As such, a careful reading of the entire conference makes interesting reading. I would particularly draw your attention to two papers: "Monkey, Sparrow, Goldfish and Ant: Towards a Non-Dichotomous System of Ethics," by M. I. Bossley, and "Defining Man's Place in Nature: The Debate Over Ape Language Capacities," by Eugene Linden.

As of this writing, the proceedings of the IWC meeting are still being edited. They will be published at some future date by Academic Press, under an as-yet-unknown title.

● The worth of a State, in the long run, is the worth of the individuals composing it, and a State which postpones the interests of *their* mental expansion and elevation to a little more of administrative skill, or of that semblance of it which practice gives in the details of business . . . will find that with small men no great thing can really be accomplished.

John Stuart Mill,
"On Liberty," 1859

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PROPOSAL

G. Harry Stine

P FOR A PROPOSAL

When business gets slow, managers as well as scientists and engineers are put to work writing proposals for new work. These can be "unsolicited proposals" in which the company is trying to sell something to someone else, or they can be written in response to an RFP (Request For Proposal) issued by an agency of the federal government. Proposals are supposed to provide the customer with an opportunity to evaluate the capabilities of various vendors so that the best product or service can be obtained at the most economical price. However, proposals are usually icing on the cake, because the winner of a contract is the company who's laid considerable political groundwork first. Therefore, proposals actually serve to perpetuate the fiction of competition. Since the contract winner is a predetermined certainty, very few proposals are actually read by customers. The following Proposal can therefore be copied verbatim and submitted more than ninety percent of the time with the secure knowledge that it will never be read because it doesn't make any difference anyway.

1. General Experience:

A detailed list of the large number of programs that have been mismanaged by this company would be beyond the scope of this proposal. See Report 789-2 of the United States Air Force Board of Inquiry or Report 1209-A of the Congressional Investigating Committee. We feel, however, that the experience gained from these failures puts the company in a strong competitive position since it is highly unlikely that these mistakes will be repeated. Our competitors may list a greater number of failures, but we would like to point out that our errors were made on larger and

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more important projects. Furthermore, this company has absolutely no experience in the specialty areas required for the project and can therefore approach the problems without prejudice.

2. Organization:

We have reviewed this question carefully and find that we are unable to determine the precise instant of time at which the customer desires to see the organizational structure of this company. We are therefore at a loss concerning how to present it in this proposal. We have investigated the use of high-speed motion picture cameras and video recorders as a means of presenting a changing organization. But we feel that these will not meet the requirements, given the present state of the art. We therefore request that the customer specify the moment at which he desires to see the organizational structure of this company. We would suggest a time during the interval from 2:00 A.M. to 7:00 A.M. on Sunday because experience has shown that the rate of change is at a minimum during this period.

3. Key Personnel:

We have discovered in recent proposal responses that our key personnel received position offers from our competitors a few days after the submission of a list of personnel from this company. Since there seems to be some evidence of a security leak in the customer's organization, we request that a need-to-know be established before we supply this information to you.

4. Technical Approach:

Our plan of attack for this project is to hire managers and technical people from companies that lose the bidding. Our technical approach will therefore be determined by these people and can be obtained from our competitors' proposals. We do have a few guiding principles. We have found that on a project of this nature about twelve to eighteen months are required to catch up with the state of the art. This time is therefore spent visiting other companies, universities, and test sites, in reading classified reports that were previously unavailable to us because of need-to-know requirements, and in clipping pages of trade magazines. This period is followed by a six-month study phase. At the end of that time, it is usually desirable to start travelling again because of the extremely rapid progress and many changes that have taken place in the state of the art.

5. Schedule:

In order to improve the appearance of this proposal, our art department has made a seven-color viewgraph schedule using stereoscopic Plexiglass overlays. The dates on this schedule represent a weighted average between the estimates of the Engineering Department and the Sales Department (they are the Sales Department's figures). In any event, company practice is to terminate a project when the personnel are needed on a new and more profitable contract.

6. Subcontractors To Be Used:

We do not anticipate using any. It is a firm company policy never to let a dollar get out of the house.

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7. Cost Information:

Engineering: We do not plan to spend much money here. We have found that engineers make changes. Making changes in production units reduces profits.

Facilities: This is a large budget item. We view this contract as an excellent opportunity to build up our plant and to modernize capital equipment.

Testing: No costs have been budgeted because we do not plan to test. In the past, test programs have revealed faults and caused cancellation of contracts years before the mistakes would have been discovered in the field.

Entertainment: This item was apparently and inadvertently left out of the Request For Proposal. We have added it.

8. Contract Forms and Profits:

An exhaustive study will be made during the first six months of the contract to consider these factors. All of the modern techniques of operations analysis, game theory, and high-speed computing will be applied to the problem of profit optimization. Key points in this study will be legal loopholes, tax dodges, and evasively written contract clauses. It is anticipated that several nationally known consultants will be retained for this work because of the overarching importance of the problem.

9. Physical Resources:

An excellent survey of our physical plant facilities is contained in the Receiver's Report prepared during our most recent bankruptcy proceedings. A copy of that report is appended.

10. Additional Facilities Required:

It is our belief that an important project such as this one should not be carried out in our shabby plant. We plan to use customer-furnished facilities exclusively. We should like to point out that several directors of our company as well as members of our congressional delegation have excellent properties for the location of these new facilities that they would be willing to sell to the customer. ■

MACK REYNOLDS, 1917-1983

Mack Reynolds, a prolific contributor well known to Analog readers since the late 1950s, died of cancer in a Texas hospital on January 30, 1983. According to Mike Ashley's *Complete Index to Astounding/Analog,* he was *Analog*'s third most prolific contributor and also one of the most popular; he was the only author ever to have as many as ten novels serialized here. Mack Reynolds's stories are perhaps best known for their persistent and thought-provoking exploration of alternative socioeconomic systems.

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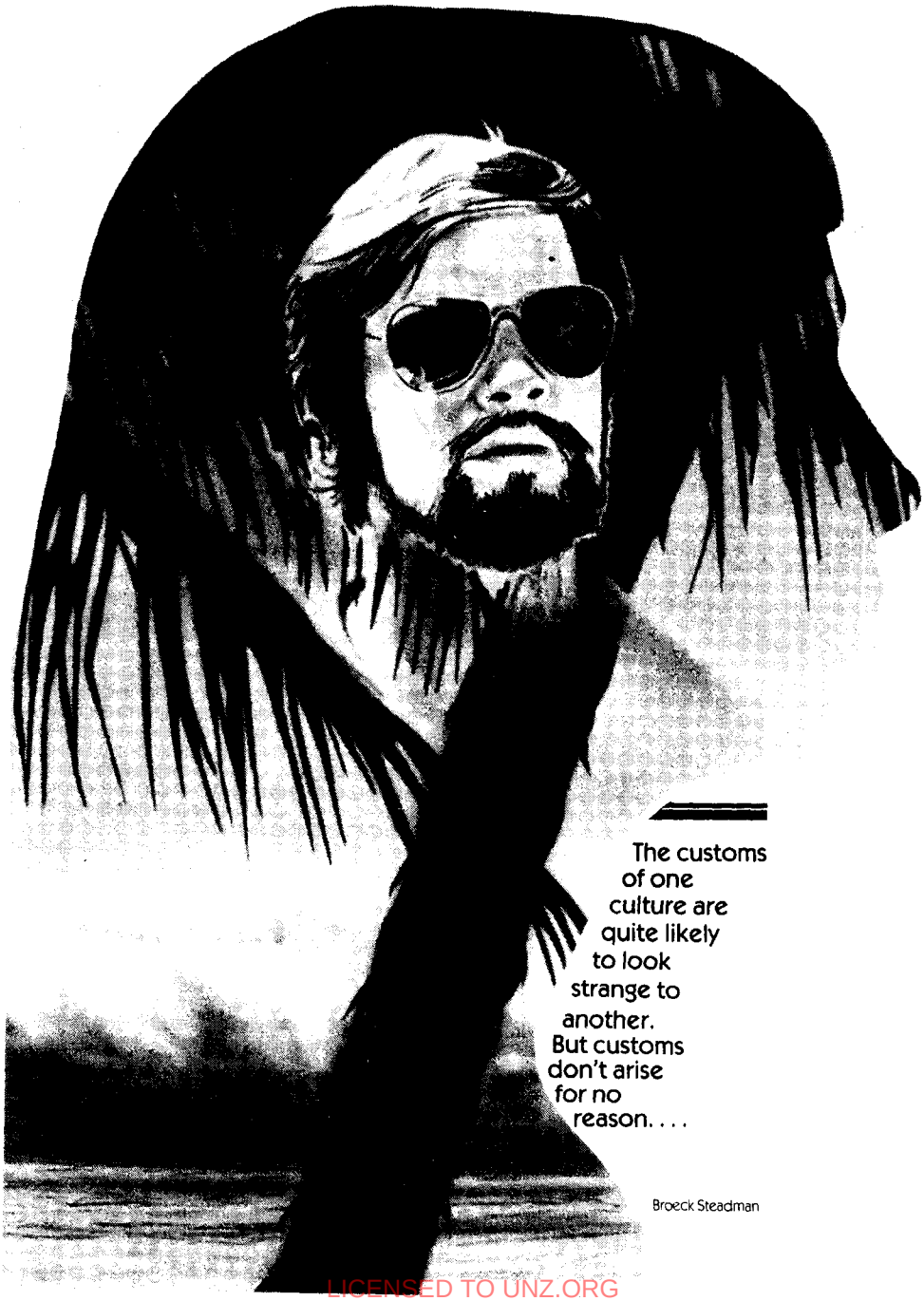
The customs of one culture are quite likely to look strange to another. But customs don't arise for no reason. . . .
Broeck Steadman

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"These are serious charges, Spagnolo." The review judge looked up from the sheaf of papers and sighed. He hated cases like this, where sentencing must go against his inclinations.

Derek Spagnolo was young and straight and clear-eyed. The kind of eager, dedicated recruit that Space Exploratory Forces found all too seldom. A career man, a family man. Well trained, too: an academy degree in xenostudies. Alien languages, psychology, the whole bit. A pity for him to be washed out after his first assignment, but there seemed no choice.

No, thought the judge, he couldn't relax the rules, much as he sympathized with the young man. If he made an exception for one, it could be a dangerous precedent.

Derek heard his sentence in stiff-backed silence. It was no surprise—he had made no defense at all. Throughout the hearing he had been lost in the past, absorbed by a vision. . . .

The sand sculpture rose in lacy fretworks from the flat gray beach. In the last glow of the setting sun the airy structure burned molten, red-gold.

The crowd gazed in speechless wonder and breathed a common sigh. When the last traces of color vanished, they turned silently and went their separate ways back to the tents.

Derek remained. The small tide would come soon, and by morning the soaring delicate traceries would be only a memory. He touched a thin column with a finger and started a trickle of sand. Anlis had used the lightest of resins, only enough to keep her creation intact until the showing. Already it was beginning to crumble, and the tide would sweep over a ruin.

He felt a touch on his shoulder. "Come away; you must not watch it die," Anlis said. Even in the dusk he could see that she was pale.

"Are you all right?" he asked. She had been working for twelve hours, almost without pause, and he could imagine the desolation she must now feel.

But Anlis was calm. "Yes, it gave much pleasure," she said quietly. "But now it is over; we must leave."

She turned and walked quickly away, and he followed her. As they crossed the tide line she stumbled, and he took her arm.

"Slow down," he said. With alarm, he felt her tremble. "Let me carry you," he begged.

She hurried on, however, until they were well into the dunes. Then she sank down upon a grassy hillock and caught her breath. The moons were up, and in the silvery light her eyes shone with the luminous quality peculiar to all Lurians.

Derek knelt beside her, still troubled by her obvious fatigue. She had not allowed him to approach her all day. While she had been at the beach working, he had watched from afar, wondering at the furious energy she expended on something so temporary.

Now she seemed scarcely able to move. "Why do you do it, Anlis?" he asked, chafing her cold hands. "It was beautiful, yes. It was a triumph. But so short-lived. Why can't you sculpt in a medium that lasts longer than a sunset? You could still use sand, but with more resin. It could last for days, or weeks."

"Your people do this?"

"No, we sculpt with stone, which

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lasts forever. We have statues that are thousands of years old."

"How very strange." She leaned back in his arms, fitting her thin body comfortably to his solidness. "You Terrans live always with your past, a heavy burden. But you are strong, and can support such a weight. We cannot."

He knew better than to question her answer. Lurians disliked argument. They refused, in fact, to pursue a subject once they had given one of their oblique final statements.

Anlis was too precious to him to risk annoying with what she called "fool's-talk." He cradled her gently, burying his face in the thick soft hair that smelled of sun and sea and pungent marshgrass. Silently they listened to the first whisper, then to the rush of the tide as it swept over the beach behind them. Anlis shuddered once, but then she seemed to grow stronger. "Let us go home," she said, escaping from his arms. She pulled him to his feet.

They climbed the dunes toward the two great disks that lightened the eastern sky. Derek fancied that he could see them draw closer to one another. In ten days they would be in congruence, and the great tide would sweep over the entire island.

Anlis shared his thoughts, gazing at the moons. "Soon it will be time to leave," she said. "You will finally get to see our migration, and capture it in your picture-boxes." She smiled, but without joy, mockingly. "Then we, like your statues, will be preserved for thousands of years. Will you look at us again and again, our dead images, back on your own world?"

"Yes, it's important to us. It's a record; it's history." Derek had never been able to make her understand the purpose of his studies. To Anlis, only the present moment was real; the past and the future were as insubstantial as the sand sculptures that members of her guild built anew daily.

She continued to tease him, holding tightly to his arm and pressing close as she attempted to match his stride. "And will it warm you at night, the picture of me? My voice—will you talk to it?"

It was the closest she had ever come to complaining about his imminent departure. "You know I would stay, if I could," he said. God, how he would miss her. But give up his career to live with sea-gypsies on a backwater planet? It was a mark of her ignorance, or her innocence, that she would even suggest it. And it was a mark of her hold on his soul that he would even entertain the thought.

"I know: you must return to your wife," she said. He had never deceived her, there. But she took his Terran ties lightly. "I would not mind being a second wife. Or a pleasure-girl. To stay with you."

Derek sighed. It would be cruel to raise false hopes. "Anlis, I've told you — it just isn't possible. The quotas . . ." Even if he agreed, she could never wait so long.

If she was affected, she recovered quickly. "Ah, what does it matter," she said. "We are together now." Her eyes glistened; not with unshed tears, but with a child's happiness in the moment.

Thank God she was incapable of dwelling on the future, Derek thought. Nor would she be burdened with mem-

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ories. Their separation would be much more painful for him.

They looked down upon the scattered tents of the village, the hanging nets and the rings of nightfire. Anlis released his arm and began to run, her faded red skirt streaming behind her.

He caught up with her at the drying racks. Perhaps it was a trick of the firelight, but her smooth face had an uncharacteristic expression of urgency. That night, in the tent that flew their two banners, her lovemaking had a feverish quality, her moans of pleasure almost cries.

In the morning Anlis remained inside, lazing on her cushions in voluptuous idleness. She was excused, she said, from guildwork for a week.

Derek wandered about the village alone. For the first time he observed signs of preparation for the approaching exodus. The drying racks had been lengthened, and from the dunes he saw that the fishing boats had departed earlier than usual. The village was unusually quiet, deserted except for three figures, a woman and two small boys starting down the marshfarm trail.

Derek intercepted them, recognizing Marta. The tall, brown-faced woman greeted him with a smile. "Derek! Would you try your hand at farming today?"

"Is that where everyone is?" he asked.

"Yes." She made a grimace of shame. "I am late, as usual. Though I may be forgiven if I bring an extra pair of hands. There is much to harvest."

"I'll come," he promised, "after I get my holo equipment."

"You and your picture-boxes! Are you never without them? Tell me: must Anlis suffer them even in your bed?" She exploded in great peals of hearty laughter.

Derek left her, wondering again at the ever-shifting affections of these people, the apparent lack of depth. Marta evidenced no jealousy of him, though she had been living with Anlis, along with Choam the weaver, when he had displaced them both. Marta and Choam had removed their banners without complaint when Derek had objected to a menage of four; they would just as willingly have included him.

Derek returned to the tent for his cameras. Anlis was dozing, and he moved quietly to avoid waking her. Studying her, he felt a rush of tenderness. Her dark hair spread like a smoky cloud over the pillow, her face and form delicate and fragile in repose. As an artist, she had been sheltered from the more rigorous chores of the other women, and lacked their stamina. Though strong in her own way, she was still depleted from the long hours of sandshaping.

He longed to keep her forever within the protection of his love, to give her a more civilized life. It was hopeless, of course, and had been so from the beginning. That same love was a coil around his heart. SEF frowned on such liaisons, and of course there was Sarabeth, waiting.

The coil tightened, and he tried to assuage his troubled conscience by remembering that it had been Anlis who had wooed.

She had chosen him from the day he first arrived in the village. She admitted it later, laughing at her boldness. "You were so stern, so official, with your

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picture-boxes and your voice-boxes and the scrolls from your headmen, that none of us could read. But your eyes were those of a frightened little boy, and your beauty . . ."

"Men are not beautiful," he had corrected her, half annoyed, but she had rushed on:

"I knew I must capture that beauty, for a night, for as many nights as you were with us. You see, you are my prize."

It was true. She had stalked him. On the shore, at the trading stalls, at meals in the long tent—wherever he went, her shining gaze devoured him. On a starry night after the evening ceremonies he had succumbed. The sculpture had been a serpentine twining, gilded to disturbing life, the singing a sensuous plainsong. When Anlis took his hand he followed her, down a narrow path between the dunes to a sheltered cove where reeds grew thickly to the edge of the water. They had made a canopied nest of the wide-bladed rushes and there, with the water lapping so close they could touch it, made exquisite love.

He remained her prize. Anlis enjoyed sex with an uncomplicated pleasure, at times with an abandon that Derek had imagined only in fantasies. He would have counted himself the luckiest of men except for that niggling Terran conscience that warned of a payment due.

Yes, he would pay dearly, Derek thought, gazing down at her with heartache. She stirred, and he moved back. The shadows under her eyes were dark in the shaded tent; he would not disturb her rest.

He slipped from the tent and followed the soggy trail to the marshes. The harvest field was in a brackish wallow, and the workers were coated with mud as they stooped to pull the deep-rooted tubers. Derek took a number of holos, then rolled up his pants and helped with the digging.

It was filthy, backbreaking labor, and worse as the sun advanced. Sweat blinded him and pain rode his spine, but he forced himself to at least keep up with the children. When even they left him behind he would have quit, but a burly workmaster came to empty the sacks and his grunted disparagement worked as a goad. Derek continued until everyone stopped for the midday meal.

Then he straightened gratefully, trying not to grimace as his back creaked. He joined the others at a barrel of water that had once been fresh, and cleaned himself.

"Come eat with us," Marta called, beckoning.

Derek only wanted to escape. "No, I'm going back to check on Anlis," he said.

Marta grinned, and he felt like a fool. Damn her, he thought, as bothered by what she had once been to Anlis as by what she must be thinking of him.

He left the marshes with aching muscles and bruised ego; less than a man. But as the path rose, a reviving breeze blew from the sea, and he was Derek Spagnolo again. The wonder of being on this world had never left him, and his endless curiosity had never abated.

He left the path to climb a dune that overlooked the beach. The strictures against viewing an unfinished work did not apply to him, and he itched to see tonight's sculpture.

It was a team effort, involving scaf-

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folds. Six artists labored on flimsy platforms, shaping mountains of sand. They worked under the burning sun with an intensity that approached frenzy; desperate, Derek knew, to finish before sunset.

He watched for an hour until he remembered Anlis and hurried back to the tent. He found her awake and devouring a huge stack of fishcakes. She spent the afternoon happily planning her evening wardrobe, and after still another meal the two of them joined the procession to the beach.

Anlis was radiant in glittering scarves and bangles. She skipped barefooted around the clumps of spiny grass, laughingly urging him to follow, daring him to capture her.

After a wild chase and a breathless kiss that almost caused them to lose track of everything but their own pounding blood, they parted and proceeded more sedately to the ceremonies.

The villagers thronged the beach, where six sand obelisks soared in perfect four-sided symmetry: graceful, imposing, monolithic; yet fragile as a child's sandcastle.

As the musicians' guild tuned up, the Lurians ranged themselves in uneven rows facing the sculptures and the sea. The six artists sat apart in an exhausted circle, leaning on one another, their eyes dull and their faces blank as masks. Anlis moved to speak to them, but changed her mind and returned to Derek.

He pressed her hand, understanding her empathy. Then he was caught by the sound and the spectacle.

The reedpipes predominated tonight, a soulful wail that ascended to a single clear note of piercing beauty precisely as the obelisks were tipped with fire.

Heads bowed as the pillars glowed pink and slowly darkened. An old man began a chant, a tribute to beauty and to the artists, that ended in words from a language Derek did not know.

"What did it mean?" Derek asked, as they turned from the already crumbling towers.

Anlis frowned, thinking. "It is hard to say: 'This moment, this touch, this sight. It is all.' Something like that."

"Who is the man? Would he talk to me, tell me anything about your history?" Derek had searched vainly for any spoken or written records of the Lurians. Constantly fleeing the great tides and resettling islands whose landscape was drastically altered, the nomadic seafolk had learned to eschew anything permanent or binding. And along with trappings that would only cause pain when they were lost, they counted all memories of the past.

"Yes, of course he will talk," Anlis said. "Of the moons, and of the fish catch, and of his new granddaughter. But not of dead things. Please do not insult him."

Anlis had proven a reliable guide in manners and mores, and he bowed to her advice. It was due to her intercession that he had obtained what material he had—the holos, the tapes, the small artifacts. Still, it was not the comprehensive survey that he had planned. For his first assignment, he had wanted nothing less than a triumph. He had hoped to discover Lurian myths and legends, to unravel the mystery of their origins, but not even Anlis could help him there. He would return to the SEF base when the

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villagers left their island, and his report would be less than complete.

However, a first-hand account of the migration and flood would do much to make up for the gaps in his survey. With Anlis, he could experience it all.

Each night the tide reached higher. The villagers continued unhurriedly to dry fish and tubers and stringy marsh-plants, the artists to erect daily sculptures on the narrowing beach. Not until the storms came and there was no beach at all did they finally flee the island.

Derek was in a lead boat with Anlis, along with Choam and a herdsman and three wooly *caffas*. The boat pitched in the choppy sea, and the sedated animals retched. Derek, a poor sailor, tried to conceal his own discomfort in the face of the Lurians' composure.

They landed finally, after two hours that had seemed endless, on the nearest high land—a mountainous ridge that jutted from the water like the spine of a monstrous sea creature. It was inhospitable bare rock, and Derek easily understood why the Lurians preferred the more pleasant low-lying islands, in spite of the necessity for a yearly exodus.

He left Anlis on the plateau where her people would wait out the tide. The SEF base was farther up on the same ridge, and he hurried to check in.

He found Jake Millikin inside the bubble-hut, cataloging ore samples. The dark-bearded geologist leaped up to clasp Derek's hand. "Spagnolo! Thank God—Elaine was about to take the skimmer to look for you."

Derek winced at the grip. Jake was short and compactly built and enormously strong. His beard was peppered with gray and the top of his head was bald, but he exuded more energy than most younger men.

As always in Jake's presence, Derek became an awkward tenderfoot. He found himself stammering an apology. "I'm sorry—but I couldn't leave before the Lurians did, and they were in no hurry. I know I should have sent a message."

Jake grunted. "It would have helped. The tide's already flooded the eastern atolls. Looks like you got out barely in time."

"Last night it was almost licking our toes," Derek admitted. "But there was nothing I could do. The Lurians didn't even start loading their boats until we were practically afloat."

"Nerves of steel, eh? Just what are they like?"

Derek was grateful to get Jake on a new track. "They're a remarkable people. You could call them brave, yes—but I think phlegmatic would be more apt. The tide has shaped their emotional makeup as well as their lives. They're so calm you wouldn't believe it. Accepting. To leave everything like that year after year, to have their homes destroyed—they've learned to care very little for material things. Nothing binding, nothing permanent. They have almost no sense of the past, unfortunately. I've been able to get no history on them."

"Looks like you have something, though." The geologist eyed Derek's bulging packs and duffle. "I hope it's some goodies SEF can use. Parsons and I have come up with zilch."

Derek glanced in surprise at the rock-

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strewn table. "You mean—there's nothing of value in those samples?"

Jake scowled. "Iron, quartz, traces of zinc. Nothing to even pay for the survey. None of the readioactives or gemstones SEF was hoping to find. No, this trip's a bust as far as I'm concerned, and Parsons hasn't done much better."

"What's that about me?" Elaine Parsons came into the hut along with a blast of rainy wind. She secured the door and pulled off her slicker and watchcap to reveal a long-legged, lithe figure and short-cropped blond hair plastered damply to her head.

Beautiful, cool, competently professional, Parsons was a marine biologist with several exploratory missions to her credit. Like Jake, she was a SEF pro, and like him too she made Derek uncomfortably aware of his junior status. He had been glad when his area of the survey took him away from the base.

"I was giving Derek the bad news about our findings—or lack of them," Jake said with a wry grin.

"You know it, then," Parsons said. She slumped into a chair and towelled her hair. "There's nothing on this planet to interest SEF. Jake and I were hoping you'd have enough artifacts so the mission could at least meet expenses."

Derek understood their concern—they were both ambitious and both up for promotion review. But he couldn't help them.

"Sorry to disappoint you," he said, showing them the small collection of jewelry, the tapes, and the slides.

"No art?" Parsons said, dismissing the shell and bone ornaments.

"Nothing we could use. Their art form is sand sculpture. It's fascinating—here, let me show you these holos—but all we could export would be a pile of sand."

"Gods, those are fantastic sculptures," Jake gasped. "But do you mean you couldn't preserve even one for the SEF museum? And a couple to sell would be worth a small fortune."

"It's out of the question," Derek said. "The Lurians don't look upon art as anything lasting. There's something symbolic in its being destroyed each night—like their lives, with the great tide. Starting anew every year."

"Couldn't you persuade them to make an exception?" Parsons said. "Your girlfriend ought to help."

Derek started in surprise.

She fixed him with her cool gaze. "I watched the landing. I saw you come ashore, Derek. That's quite a little beauty who rowed you in. She seemed . . . friendly." She arched her pale eyebrows. "A fringe benefit?"

Derek felt the heat in his face. There was no hiding anything from Parsons. And she'd be the one to write it up, too.

But she let him off the hook. "Relax, I wouldn't report you," she said. "Hell, I don't care anything about your personal life. It's great for us you've got a . . . special friend. Couldn't she persuade her people to make a few rock statues for trade? Or let us plasticoat some sand ones?"

He didn't tell them that Anlis was an artist. "I'll try, but don't get your hopes up," he said. He didn't want to encourage them. "And even if it doesn't work," he added, "surely SEF can't expect a profit from every mission."

"Can't they?" Jake said sourly. "Get that academy idealism out of your head.

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SEF is a business. Jepco is underwriting this survey, and they expect to get more out of it than scientific information."

Derek was troubled by Jake's scowl, and even more by the whispered conversations between him and Parsons that night. It wasn't hard to figure out their import, and when Parsons approached him the next morning he wasn't surprised.

It was a threat, no matter how politely couched. "Just two or three pieces," she said quietly. "We all want this mission to be a success. And we all want a good report, don't we?"

It was clear whose report she meant. "Your friend is outside," she said in conclusion. "She's been lurking around the camp since sunup. With that kind of devotion, she ought to do it for you."

Derek did not reply. He would have asked Anlis in any case, but he hated being pressured. He choked down the breakfast that had turned sour and left the hut.

The rain had stopped, but the wind still blew in sharp gusts. He found Anlis in the rocks just beyond the clearing.

She had only a light cloak, and ran shivering into his arms. "I came here twice during the night," she said; "but you would not come out. I didn't like to sleep alone."

He sighed. "I told you: I must stay here now. And you must not come after me." He brushed back the cloud of dark hair and kissed the smooth forehead, the blue-veined eyelids.

Her face remained wistful. "But I miss you so much." She pulled at his arm. "Can you come now? Our tent is ready."

He followed her down the slope, but his thoughts were not of lovemaking. Though Anlis was as dear to him as ever, he regretted now his entanglement. He knew that she would not like what he must ask of her, but he was caught in a trap. Anlis . . . the Lurians . . . Parsons . . . SEF. They warred in his mind until he wished he had never seen the planet, never chosen his career. He had been so proud of his academy record, of his being selected for the mission. Now it would all end badly unless he pressed for something that he knew in his heart was wrong. He had studied in his courses the importance of native tradition and the dangers of meddling with it, but more weighty than old lectures was the prospect of his ruined career.

They were scrambling over loose rocks, and he stopped by a waist-high boulder. "Just a minute—not so fast," he called. He chipped at the brown rock with his pocket knife. It flaked easily, and revealed reddish-hued striations where it was cut.

"Could you make a figure from this, Anlis?" he asked. "Like one of your sand sculptures, that I could take away with me?"

She hesitated uncomfortably, her eyes downcast. "You know . . . it is not done," she mumbled.

"For me? To show that you love me?" he urged. "It would mean something of yours, so that you will always be with me."

She looked up, wide-eyed. "You want that, truly? You know our ways . . ." Her voice drifted off.

"If you love me," he repeated.

She turned away and pulled the hood of her cloak to shadow her face. When

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she faced him again, he could not see her expression. "Yes, I will do it," she whispered. "A gift to you, for you have given me such happiness."

He hugged her thankfully. Maybe, he thought, it would turn out all right. He would be safe, and there might even be a benefit for her. "When your people see that the beauty you create can be lasting . . ." he began.

"They must not see—they must not know what I am doing. It is all I ask." She gripped his arm tightly.

"Of course, whatever you want," he acceded quickly. "We'll find a place where you can work in secret."

She relaxed. "Then, I would begin now." She pushed back her hood, and her face was calm. She ran her hands over the rough stone of the boulder. "Yes, it speaks to me," she said. "But I am not used to the hardness; it will take longer than with the sand."

He felt a new stab of worry. "Will you be able to make three figures before you return to the islands?" The SEF team was scheduled to leave immediately after the eclipse.

"I will do as much as I can," she said quietly. She paced the rock, and measured it with her hands. Then she stood off and studied it from several angles. Her eyes narrowed and she muttered something unintelligible to Derek. She seemed to have forgotten him, already caught in the fever of creation.

He remembered how she had overstrained herself before, and cursed himself for pressuring her. "I don't want you to get too tired," he cautioned. "Forget about the work for now. We can go to the tent and relax for an hour before you begin."

Anlis, though, was already beyond his reach. She pushed him away. "No—I must be alone. I would go now to find a place to work."

"At least let me help you with that." She was struggling to lift the boulder. "I'll move it for you later," he promised; "after we find a spot."

She agreed, reluctantly, and they began to search the mountainside. They found a cave beneath an overhanging ledge. The light was poor, but it was sheltered from the wind and Anlis protested herself satisfied. Derek dragged the rock up with a travois, and then she insisted that he leave.

He did so with guilty relief. Anlis loved her work, he told himself; it was the one constant in her world of shifting affections. Already he was out of her thoughts, and since he was to leave so soon, it was for the best.

He did not see her for three days. At the SEF base they were preparing for departure. Derek had informed Jake that the statues would be made, and after that he avoided both him and Parsons as much as possible. It was not difficult; Parsons spent most of her time at the water, setting up instruments to measure the tidal forces, and the two men were busy with breaking camp and readying the shuttle. There was still tension, but the excitement of the coming tide pushed everything else into the background.

The moons converged, and on a dark night the sea became a swelling, surging maelstrom. Derek and Parsons watched from the skimmer as sledgehammer waves pounded the cliffs. The low islands disappeared, the remains of the Lurian village first leveled by the roiling water and then buried beneath it.

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There was no activity on the plateau. Even with the dawn the Lurians kept to their tents, remaining there during the entire period of the tide. When the waters began to recede they came out, slowly at first and then in a sunlit rush of shouting and laughter and song.

Derek hurried to join them, amazed to find everyone dressed in clothing that looked new. At least, it was freshly dyed. Bright colors—reds and yellows and greens—predominated in the pantaloons and long skirts of the men and women, and even the children boasted vivid shirts or sashes or scraps of ribbon. Like tropical birds they lined the gleaming cliffs, watching for their islands to reappear.

Derek searched the crowd for Anlis, but though he walked the cliff edge for a mile he could not find her. Marta, strutting proudly in a brilliant green cloak, eyed him like a stranger and shrugged off his questions.

He asked others, but no one had seen Anlis. Her tent was deserted and unfamiliarly neat. It looked as though it had never been occupied, the ground swept and the sleeping mat unwrinkled.

With growing apprehension he headed for the cave. Surely, he thought, she would not have worked night and day.

But apparently she had. Three completed statues stood in the mouth of the cave. The large boulder was a head, with a serenely smiling face. Another was an abstraction of balanced blocks and the third, the smallest, was a slender fish caught in curving motion. Though they lacked the smooth finished perfection of the sand sculptures, they displayed the same sure touch, the sense of form and life within the medium.

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"They are beautiful," Derek breathed. He called, "Anlis!"

He stifled his call. Anlis lay far back in the shadows. She was curled up like a fetus, and though he had often seen her so on the mats, he knew with a sinking sick dread that this time she was not asleep.

She was already stiff and cold.

A stray beam of sunlight escaped the overhang and found its way into the cave mouth. It caught the stone head, warming it and infusing it with rosy life.

Her life, Derek thought; her breath. His anger exploded in a red rage. Self-anger, and a shame that could not be contained.

With a strangled cry he seized the smiling head and hurled it to the rocky ground. It split into three pieces, and he repeated the process with each fragment until only a pile of rubble remained.

Methodically he attacked the blocks and the fish, pounding them until they too were reduced to shards. Panting, he ground the shards with his boots until there was nothing but a pile of dust. Only then did he stagger, wracked with sobs, out of the cave.

"The planet is now closed to us," the judge said; "the Lurians will have no further contact.

"But that's not what I'm concerned about. It's you, and your future."

The young man seemed much too impassive, the judge thought. "This report by your team captain is one of the harshest I've seen," he continued. "Have you anything to say in your favor? You may, of course, appeal."

But Derek shook his head. He did not consider his dismissal unjust. None of that was important. All that mattered to him now, all that kept him going, was the end of his vision—that last look backwards before he had left the cave and gone to the Lurians for help.

Anlis had stirred. ■

● The release of atomic energy has not created a new problem. It has merely made more urgent the necessity of solving an existing one. . . . Since I do not foresee that atomic energy is to be a great boon for a long time, I have to say that for the present it is a menace. Perhaps it is well that it should be. It may intimidate the human race to bring order into its international affairs, which, without the pressure of fear, it undoubtedly would not do.

Albert Einstein,
Out of My Later Years

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The Alternate View

TO PROVIDE FOR THE COMMON DEFENSE

Jerry Pournelle

"WE, THE PEOPLE of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America."

In the hot summer of 1787 a remarkably talented group of men met in Philadelphia to institutionalize the first—and in some ways the last—real revolution in history. The Framers set out their goals in the Preamble. Now that we're approaching the 200th anniversary of the Convention of 1787, it's appropriate to see how well they accomplished what they set out to do.

The first goal, a more perfect Union, seems secured, although it took the bloodiest war in our history to prove it. Not long ago, few would have doubted their success with the others. Now things don't seem quite so certain.

In later columns I want to look at what we've done to justice, domestic tranquility, general welfare, and the blessings of liberty. Liberty, in particular, was a primary goal of the Framers. However—important as the others are, if we cannot provide for the common defense, we will not survive to celebrate the 200th anniversary of the Philadelphia Constitution.

When I was young, defense was not a real problem. There was no realistic possibility of invasion, from this continent or any other. Indeed, we could have survived quite comfortably without any overseas contacts at all. As a maritime nation we had some interest in "freedom of the seas," but those interests could be protected in peacetime by naval forces. There was no need for a large peacetime army.

In those days it was easy to provide for the common defense, and Congress was able to do so. There were plenty of debates on whether it was done well. There were more debates and much acrimony when we adopted peacetime conscription prior to World War II. Whatever we did, though, could only affect the security of others. The United States was never at hazard, nor was world survival at risk.

We all know things have changed. Now not only the blessings of liberty, but our descendants themselves, are threatened.

Simply put: forget how well or how badly Congress is doing with justice, and welfare, and liberty. Can it provide for the common defense?

Most of the evidence says no.

In the early 1960s the Air Systems

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Division of the Air Force Systems Command produced a remarkable study known as Project Forecast. Forecast was one of the first real attempts at futurism. Recognizing that what one did in the '60s would pretty well determine what one *could* do in the 1970s, Forecast was an early, and excellent, attempt at long range planning. It was quite successful: that is, it showed alternatives and their consequences in a clear and consistent manner.

Forecast was so successful that in 1964 the Ballistic Systems Division decided to do their own. It was called Project 75, and it was intended to pull together into one document everything known and predictable about ballistic missile technology: structures, guidance, accuracy, warheads, yields, basing, security, command and control, and communications.

Project 75 examined every then-forseeable question of strategic deterrence. It looked at basing options. It examined multiple-warhead technology and multiple independently targetable re-entry vehicles (MIRVs). It looked into hypothetical circumstances: given that the Soviets have such-and-such capability, what does this do to our force requirements, and what must we do *now* to meet various threats in the future.

Project 75 was highly classified, because it dealt with the real and projected capabilities of the U.S., and contained the best estimates we had of what the Soviets could do. In 1968 the Air Force funded an unclassified study on "Stability and Strategic Doctrine"; this study took general capabilities, such as accuracy and weapon yield, and examined their effect on deterrence and world stability.

As it happens, I was editor of the Project 75 final report, and principal investigator of the stability study. Thus I'm quite familiar with much of what was known on those subjects as far back as 1964. During the '60s and early '70s there was furious debate on what we could do and what we ought to do.

And now, in 1983, the Congress of the United States is finally getting around to thinking about the problem. They're awfully late; very nearly too late. What could have been a series of orderly steps taken over a period of years must now be done as crash programs at outrageous costs—that is, if we do anything at all. It hasn't been proven that Congress will make *any* decision.

Some aspects of the strategic problem are highly technical. Most, though, are comprehensible to any interested citizen of average intelligence. The problem is that most citizens aren't interested, and many who are have been fed a bunch of wrong facts.

However: it is difficult to get reliable information. Moreover, the discussion isn't made any clearer by one-note writers such as MIT's Professor Tsipis, who predictably says that those who disagree with him don't understand physics: which is to say that the Department of Defense apparently isn't able to hire any physicists, a self-evidently false proposition.

Some propositions are fairly simple, though. Begin with first principles.

If technology favors the defense, you have a stable situation. If, for instance,

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the attacker must fire ten missiles to be certain of destroying one of his victim's missiles, there's no incentive to shoot first; indeed, if one side fires all its missiles, it has disarmed itself in order to knock out ten percent of the enemy's capability.

On the other hand, if one attacking missile can destroy ten of the defender's missiles, the situation is obviously unstable. The side that shoots first has a clean win. The other side is disarmed. There is therefore a strong incentive to shoot first if only from fear that the other chap, through fear of you, will shoot first.

Back in 1964 the U.S. had Minuteman deployed in silos hardened to 300 psi overpressure. What that means is that the silo is supposed to withstand pressures of 300 pounds per square inch, and will rupture if a bomb puts more stress on it than that. In practice things are more complex than that, since lower pressures might damage the missile, and higher ones might not.

Also in 1964, we could assume Soviet accuracies of something like one nautical mile (6000 feet) CEP. The CEP is defined as the circle inside which half your shots will fall. Finally, we could assume that the Soviets were using a single one-megaton warhead on their missiles. Given those three numbers —hardness, CEP, and yield—it is easy to calculate the probability of knocking out a Minuteman. For the figures given, it is just about ten percent for a single shot, and it takes twenty weapons to raise the single-shot kill probability (PKSS) to 0.9. Under those circumstances it hardly seemed rational for the Soviets to attack our Minuteman bases.

(Note: The calculations are based on the laws of probability, and the unclassified document *The Effects of Nuclear Weapons*. *Effects* may be purchased from the Government Printing Office.)

On the other hand, things change. One change was in total weight the Soviets could launch; with increasing weight they could both up the yields, and have more than one warhead on each missile. Even so, with a ten-megaton warhead —about the maximum practical, especially with multiple warheads—the PKSS only goes to thirty percent or so. It takes six warheads to get above .9 probability, so the situation remains stable.

The effects of a change in accuracy are more dramatic. Missile accuracies are affected by a series of factors which together make up what is called an "error budget." These include location uncertainties—your own and the target's; winds over target; gravitational anomalies; and, of course, the precision with which you can build a guidance system. Since 1964 many of those factors will have been greatly reduced.

For example, satellite observations will have driven location errors nearly to zero. Observation of polar satellites will greatly reduce gravitational anomalies. Development of computers will allow construction of better gyros and other precision equipment.

Thus: it was easily predictable that the Soviets would be able to reach 3000-foot CEPs within a few years. At that CEP a one-megaton bomb has a 30-percent PKSS. Things are still stable.

Accuracies, however, inevitably get better: and at 800-foot CEPs the PKSS

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for a megaton goes above ninety-nine percent, while a 100-kiloton weapon has a nearly seventy-percent-chance of killing a 300-psi silo. If you put ten warheads aboard the attacking missile—and this is not impossible at all—then each attacking launcher has a ninety-nine-percent chance of killing 2.5 defending birds.

This is not a stable situation at all. We may already be there. If not, it's inevitable—and we've known we'd get to that point since 1964 and before.

Thus was developed the "triad" strategic doctrine: that the U.S. would have a nuclear deterrent resting on three independent legs, so that dramatic technological breakthroughs could not—we hoped—threaten all three deterrent forces with a single development. The three "legs" chosen were manned aircraft, land-based missiles, and submarine-launched missiles. Even as the doctrine was adopted, though, it was easy to foresee one leg of the triad was doomed if we simply stood still. The Minuteman component could not last beyond foreseeable improvements in missile accuracy.

The manned bomber leg would in time become increasingly less able to penetrate enemy defenses, and the aircraft themselves, designed in the early '50s, would become increasingly obsolete.

Submarines are vulnerable to tracking by a sufficiently large fleet of enemy submarines; and are *very* vulnerable to any satellite observation that can look below the surface. As I write this, I note that the Soviets have built a large submarine fleet, and that "synthetic aperture" satellite radars have been able to locate river beds below the Sahara sands, and Mayan canals below jungle and rain forest. I am told that such radars can already see many feet below the ocean surface.

Thus, in 1964 we knew that Minuteman would have to be replaced; and we studied alternate schemes. These included complex methods of launching on early warning, proliferating Minuteman, building "Midgetman" missiles, and building a new missile known as MX. MX would, of course, require a basing system; and in 1964 we studied at least forty such basing concepts, including land mobile, road mobile, rail mobile, artificial ponds, dense pack, shell game, putting them south of large escarpments, etc. . . .

It is thus with a sense of *déjà vu* that I listen to Congress debate this whole matter. As far as I can tell, there hasn't been one new argument advanced since 1964.

Way back then we had to reject most of the mobile schemes: by the time you could build them, satellite observations would be too good, and meanwhile you invite the enemy to use saturation techniques: explode a few hundred 100-megaton weapons at high altitude. It's as if you forced your enemy to use a hand grenade in a crowded room.

Air mobile looked good, but costs too much. Shell game looked good, and many favored it, but it's politically a liability, and anything that depends on keeping information out of the hands of the KGB is a bit suspect; they're very good at espionage.

Hard rock silo basing by itself doesn't work beyond 400-foot accuracies; hard to attain, but not impossible. Thus

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"dense pack," which attempts to use the enemy's multiple weapons as part of the defense. There are a lot of assumptions in the "dense pack" basing scheme; some of them may well be incorrect. It may be there are better basing concepts. It may be there are not.

What is certain is that we don't have a lot of time before the Marshal of the Soviet Union can predict, with some confidence, precisely what will happen if the war starts. This doesn't mean that the war will start the instant they believe they can win it; of course not. But until they have confident predictions of what will happen, the Politburo has no decisions to make; once predictions are possible, they do.

That doesn't sound like a comfortable world to me; but then it didn't sound comfortable back in 1964 when we tried to look into the future.

For fifteen years Congress has ignored the problem. Now, at long last and in some haste, they seem almost ready to take up their constitutional task.

The question remains: Is this a proper way to provide for the common defense? ■

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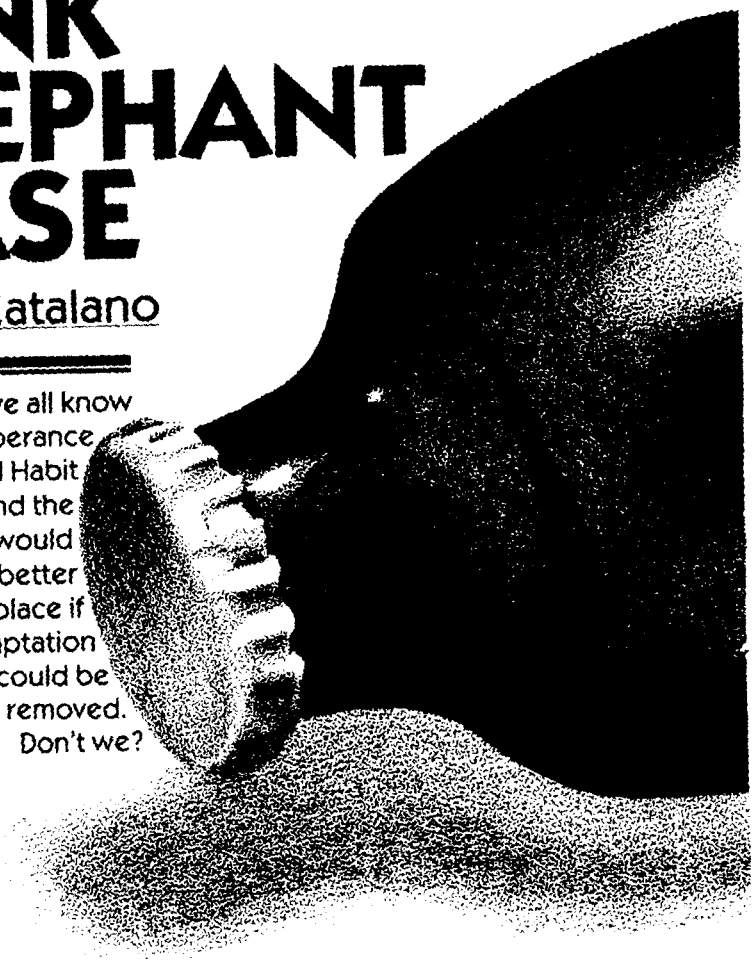
THE MISSING PINK ELEPHANT CASE

Frank Catalano

Of course we all know that intemperance is a Bad Habit and the world would be a better place if temptation could be removed. Don't we?



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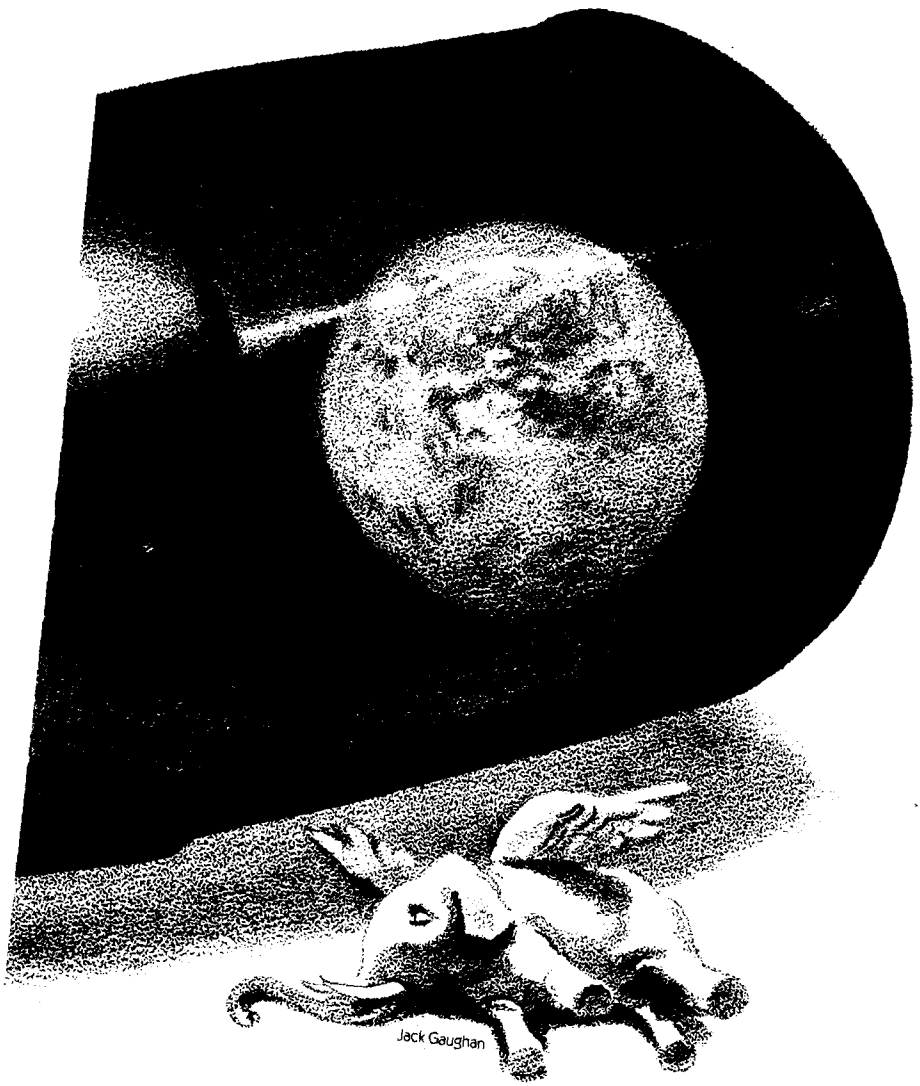

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Thump. Thump thump. Thump.

I took another unsuccessful slap at a cockroach that had skittered out from behind the rusting radiator. The chair gave a familiar squeak as I leaned up and back into it, unfolding the newspaper in my hand as I did so. CRISIS DECLARED IN LOUNGE ECONOMY, the headline blared. It had been that way for a week. Each day some new calamity seemed to befall what had been the honored, established American institution of drinking.

I flipped to the business section. Milwaukee Brew was down thirteen of its fifteen points over the last three days; three breweries were announcing layoffs; and Mogen David's temporary shutdown had left thousands of winos broke with nothing to turn to but the much more expensive hard drugs. As a result, the crime rate had gone out of sight in the city cores . . . even in areas where there wasn't much to steal, like ours.

I put the paper down as I heard someone's knuckles beat a rhythm on the outside door. Ichael curtly told them to come in, and by the way the hinges creaked I could tell the visitor was complying.

"Is this the office of the Talent Guild?" a woman's voice asked.

"Yes, it is," Ichael replied smoothly from the other side of my office door. "Ichael Renbach, executive secretary, at your service."

"I'm here to speak with a Matthew Michelenie about a case."

"Step right in," I said loudly, straightening in my chair.

She was a lot more pleasant to look at than the peeling off-white paint on my office walls. I put her in her late twenties or early thirties, slender, blond, and polished to the point of plasticity.

"Arlene Evavold, Amalgamated Restaurant Workers," she declared as she sat in the lone straight-backed chair on the other side of the desk. She handed me a card.

"Amalgamated Restaurant," I repeated. "Sure. The kickback scandals a couple of years ago in the restaurant industry. Got off clean, as I remember."

She reddened slightly, but went on with her pitch. "You *are* the president of the Talent Guild local here?"

I nodded. "You mentioned something about a case?"

"We've been less than pleased with all of this news lately," she said, pointing to the newspaper on my desk. "This beer and wine scare has hurt us pretty badly, what with lounges and restaurants laying off people because of dropping business."

"What about the hard booze customers? Doesn't their business keep your union members employed?" I asked.

She smiled wryly. "It's not the stuff of the masses. The harder liquor was more expensive to begin with, but now the prices have shot out of sight. Even what's left of the old stocks of beer and wine are sky-high—if you can get it out of the hands of hoarders and collectors."

"So you want us to find out what's behind it all?" I guessed, making a very short intuitive leap.

"Exactly."

"But why us? Why use the Talent

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Guild when the police psis are on the job?"

She scowled. "The police have been trying to find out what's been going on for days . . . and neither their science labs nor their incompetent psis have any leads we're aware of. Besides, their psis are no good after the drugs wear off, unlike you naturals. And you have no jurisdiction limits."

"The police are free, too," I ventured.

To that she reached into her white handbag and pulled out a cashier's check. It was for a very large sum. "Unlimited expenses . . . and, of course, the regular fee and whatever number of associates you choose to bring in on the case. It all comes out of our, um, emergency fund."

Once again, the police and the kickback scandal came to mind.

She stood up, leaving the check on the desk. "Do work quickly. If there aren't any more restaurant workers, there isn't any more union. And I like my job," she said, and she was out the door.

Of course there was no contract in writing . . . never is, in this kind of a case. I was just happy to be working. Those damn psi-drugs had almost been the death of our guild local. I did a bit of mental calculating and decided. "Ichael, get ahold of Superob, Mindmaster, and Xenoman. Might as well have them meet me here," I checked my watch, "in an hour."

"What do I tell them?" came the voice from the outer office.

I didn't have to hesitate. "Tell them they're going to get paid."

* * *

I settled back into the chair. What did we know for sure?

Item: Somehow, there was a problem with all the new beer and wine produced in the world, and had been for nearly a week now. No one was getting drunk. Tipsy, yes, but not drunk. It was as though the tolerance level of all humanity had suddenly risen to remarkable heights.

Item: Instead of doing what prohibitionists had once hoped and bringing peace to Earth, it had only served to piss off those who got drunk on cheaper stuff and therefore stayed out of other kinds of trouble.

Item: Police were stumped. No terrorist group had claimed responsibility, and it seemed unlikely a national government was to blame, since all countries apparently were being hit equally hard.

It was time to check with a local expert.

I was out of breath by the time I'd hiked down the seven flights of stairs to ground level of our building in the Wilshire District. I pushed open the dirty double glass front doors into the small covered entryway, where I knew I'd find Fred.

He was leaning against the wall, sporting the usual: several days' growth of beard, short-cropped black-and-gray hair, and a pair of slacks and shirt that had gone beyond the stage of having an identifiable color.

He was also wide-eyed—you know, the way kids joke when they brag about having had to put toothpicks under their eyelids to prop them up after a long night. Except Fred was managing the same effect without the toothpicks.

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"What is it, Fred? Speed this time?"

He nodded quickly. "So tell me about it," I said, squatting.

"About what?" the voice came back, a little too quickly.

"The booze, Fred. Surely you and your friends have some ideas," I said, *mentally* sighing as I slipped him a fiver. It disappeared into some recess of his clothing. Good old Fred.

He was silent, staring off into empty air for a few moments. "Some of the guys who have been around awhile, they say it can't be all the beer and wine that's changing. Some of them still make their own—and it works just like before."

I'd heard of the black market. "Go on," I said.

"We figure it can't be the hard booze boys doing it, 'cause they ain't been getting any new business from us. The best we can figure is that the government is messing with the democratic system, and screwing it up. That's it."

I mentally went through the motions of rolling my eyes, thanked him, and climbed the steps back to my office. Fred had been around a long time, had a lot of contacts on the street, but was still a Republican at heart. Too bad—the fiver would have made a nice down payment on some new whiskey.

I was just resettling myself in my chair when the first of the other guild members walked in. Jefferson Barber, or Xenoman as he called himself, was our token empath, as close as we could get to an actual telepath.

He was followed by the others I'd asked for: Robert Walton, also known as Superob, our pyrokinetic; and Lynette McCourt, who went by the professional name of Mindmaster, our limited clairvoyant. We didn't keep our real names a secret from anyone; our titles were our Registered Trademarks, or stage names, our way of incorporating ourselves. My own trade name was Nightcat, and my specialty was general telekinesis: that is, moving things around as well as "flying," which was no more complex than just moving myself around.

I briefed the others on the background of the case, including the less-than-remarkable information from Fred.

"He said something about 'messing with the democratic system.' Any idea if there was some system being messed with that would give us this mess?" Lynette asked, her blue eyes sparkling under her shoulder-length brown hair.

I shook my head.

"Looks to me that there must be a system. The vineyards and breweries are too spread out for whatever's happening to be done from one central point," Jefferson said. "Unless we're dealing with some natural phenomenon."

"We know simply by the fact there's a black market for home brew that it's not likely to be a natural thing. By the same reasoning, it's probably not in any of the ingredients, since they come from the same suppliers for both markets," I said.

"On the other hand," Rob broke in, "it can't be at the distribution level, either. There are just too many of them. Besides, how do you get the alcohol out of the bottle, or whatever?"

I shook my head again, trying to clear it. "Anyone have a plan they'd like to suggest?"

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* * *

Midnight, in central Los Angeles.

Only one word could describe the awesome range of emotion that went through my body as I strode quietly down the street: fear. Walking down the streets of central L.A. isn't something you wish on your worst enemy, especially at midnight.

The street I was walking paralleled the Hollywood Freeway on one side and the dirty limestone walls of the Brew 202 plant on the other; they fit right in with the rest of the neighborhood. I stopped for a moment, concentrated, and watched the twelve-foot wall pass as I moved up along its side. I kept exerting the mental pressure until I was even with its barbed-wire barrier at the top, then relaxed a bit and exerted just enough force to keep myself there as I checked out what was inside.

The wall surrounded the plant, with the exception of a few chain-link gates. The area inside was dominated by an oblong, limestone building, about two stories tall at either end and nearly five stories tall at its center. I figured that roughly square, center portion was where the actual brewing took place.

The others were waiting for me at the overpass near the southeast corner of the brewery.

"Well?" asked Lynette. She was leaning against one of the old-fashioned lampposts on the aging bridge. Jefferson, whose skin neatly blended with the smog, and Rob, who stood out, were settled against the concrete railing.

"It looks all right to me. Our best bet, I think, would be to get inside and start at the shipping end where they're loading the trucks for the morning runs. We can probably get into the brewery that way with the least trouble."

"And then what?" asked Rob.

"Then," I replied, "we search. Lynette seems to believe night is a high-probability time for something to happen. The brewery itself shuts down overnight, so that part should be relatively deserted."

Don't let anyone tell you that being a natural psi is easy. It's not; and is, as a matter of fact, exhausting. The energy we manipulate has to come from somewhere, and it's my personal belief it originates in the stomach. After lifting the others and myself over the wall, the hunger I felt convinced me of that again.

I checked to see if we'd been spotted.

We hadn't. I had Jefferson feel inside the shipping area to check on how many sets of emotions he felt. Three. Since I could see only two people from our position behind the delivery trucks, we needed a diversion to bring the other one out—and get us inside.

Rob did the trick. As the smoke curled up from the other end of the loading dock where Rob had ignited the oil on the asphalt, a third man carrying a fire extinguisher ran out. While they were busy, we jumped onto the other end of the dock and into the darkness behind the loading area which was the bottling plant.

Jefferson had moved to the door separating the bottling operation from the actual brewery. If I remembered any of my college chemistry properly, on the other side would be everything from the fermenting vats to the starting point where the barley malt, cereals, hops, and brewing water were all measured and mixed together.

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Jefferson turned in my direction as I moved up to where he was standing and staring. "Fear," he said softly.

"Huh?" I shot back intelligently.

"Someone, somewhere in the center of this operation, is radiating the delicate tentacles of fear."

Somehow the impressionist art Jefferson did for a living occasionally crept into how he phrased things. "How many readings?" I asked.

"Just one. But it's strong and steady."

"Nothing tampered with as far as I can tell on the bottling end, Matt," Lynette said. Rob was right behind her.

"I know," I said. "I think our answer is farther inside. Probability check?"

Lynette's features relaxed momentarily. "Still the same as before. We don't appear to have wandered off the track we were on this afternoon," she said.

"Okay. Rob, if you and Jefferson would work together, take the west side of the building. Watch for one person. Lyn, you come with me and we'll cover the east."

With only a few emergency lights on, the search went slowly. We entered the halls that led to the fermentation vats. As we neared the end of the hallway, I pushed Lyn against the wall and went into a crouch.

Out in the dimly lit room was the glint of light against metal: a flashlight against some of the piping that led into one of the large vats. And standing above the flashlight was a man—dressed in the blue of a security guard.

I was content not to move a muscle for several seconds as I watched the figure lean over a valve and drop several small items into the piping. I heard a click, and watched as he moved off to another vat.

"We can't afford to hurt him. We have no proof that what he's doing isn't part of his job here," I whispered, although I was ready to put money on it that it wasn't. I got ready for a chance to do something.

I didn't have long to wait. All at once, the man in blue shrieked, dropped his flashlight, and went hopping madly in circles.

I'll be damned. Rob had given him a hotfoot.

I rushed out from the hallway and from the corner of my eye I saw Rob and Jefferson doing the same thing from the hall across the room. Somehow, Lyn had gotten in front of me and was running straight toward the guard.

He saw her and reached for his holster. I started for Lyn, but Rob was already in motion with a beautiful flying tackle. They went sprawling somewhere to my left as I heard a bullet ricochet somewhere to my right, and then a pained cry.

Where the handle of the pistol had been in the guard's hand were now third-degree burns. Rob apparently was as good as ever at thinking on—or off — his feet.

Jefferson neatly gave the guard the side of a hand to the back of a neck to finish the process.

We didn't come up with much on the guard: some keys, gum wrappers, a comb, and a business card.

I turned the card over in my hand. In dark brown lettering on a tan background, it read *New Bernardine Protection Service*, and underneath that was

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a New York address. The name didn't ring any bells.

Jefferson had walked over to the last vat the guard had been working in front of. He frowned, knelt, and carefully picked up two or three items.

"Capsules," he said as he handed the small items to me.

This time my college chemistry failed me. I'd be damned if I knew what I was examining. They looked like a couple of cold remedy pills.

Experimentally, I played with the word as I opened my eyes. Bernardine. Damn. The only associations I was making had to do with either exotic pharmaceuticals or Spanish men.

The phone was still ringing, so I answered it, ignoring the sleeping form of Celeste next to me on the convertible sofa in our studio apartment. "Kroll and Michelenie."

"Matt, this is Rob. Awake yet?"

"I am now." What he said I wanted to hear, since I'd sent him and Jefferson off to do some fact-finding before going home to grab some daytime sleep myself. "Let's start with the lab report."

"Well, the kids at the garage say it seems to be some sort of an enzyme in those capsules, but nothing they've ever seen before. They mentioned something about experiments overseas to speed up certain chemical reactions in the body for medical purposes."

"And the business card?"

"Jefferson checked that out." He sighed. "New Bernardine Protection Service has all the licenses it needs and then some, likely."

"What about ownership?"

"Now that's kind of interesting. State records show New Bernardine Protection Service is owned by—get this—the New Bernardine Order."

"A religious group?" I asked.

"It is. Since keyboard playing and not religion is my area of expertise, I had Jefferson look into it—he studied the stuff in school. Then based on his memories of it, we checked the public library clipping files.

"Mentions of the order go back fifteen years. It was founded by a former Catholic priest named Adolfo Verde. He apparently didn't like some of the dogma, and had a personal falling-out with the church. Jefferson says the order is loosely based on the Cistercian Rule laid out by Saint Bernard of Clairvaux in 1115."

"Very thorough, but it doesn't sound real suspect," I interjected.

"Not until you look at the followers. The whole order seems aimed at upper-middle-class college kids who are looking for a purpose, though he seems to take anyone. He preaches a cause of—here, let me quote one of the articles—a Cause, capital letter and all, 'To promote the ultimate clarity of the whole.' It's estimated that from his headquarters in Central California, he's got hundreds of thousands of followers worldwide—mostly those who can't handle day-to-day living alone."

I thought this over. "But why is he running a security guard service?"

"Income, probably. Verde seems to have this fanatical push for austerity, at least when it comes to his followers. He insists they give up all to the Order, and the Order provides for them."

"That still doesn't explain what the guard was doing in the brewery. Well,

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go back to your keyboards. I'll be in touch."

I absentmindedly put the receiver back into its cradle and checked the clock. Eleven A.M. Celeste was going to be late at her psychiatric practice. I tried to wake her with a kiss, and when that didn't work, went on to other methods.

I'd rented a car for the drive to Beverly Hills to buy my informant lunch, and listening to the radio news on the way hadn't cheered me up. The Drought, as the news media was now tagging the problem, hadn't been handled calmly anywhere. There was word of mass arrests of bootleggers, who were buying up the ineffective beer and wine and adding grain alcohol to it, then passing it off as the real thing. Reports also were out of a national emergency in the French economy, and of threats of martial law in northern Italy's wine country, where citizens had taken to marching in the streets.

I quit these musings when I heard a throat being cleared. A woman was standing next to me, surrounded by the hanging plants that seemed to be the hallmark of this eatery.

"Oh hi, Judy," I said.

"Lost in thought?" she asked. Her curly brown hair bobbed above her large gold-rimmed glasses as she slid into the opposite booth seat. She was carrying a large manila envelope.

"Just the case. You were able to find something out." I have few friends in the financial community, but Judy was an old friend of Celeste's who just happened to be vice-president of the second-largest discount brokerage house in Los Angeles.

She pulled three photocopied sheets out of the envelope. "I think you'll find these helpful."

They were standard financial statements for three different companies. New Bernardine Protection Service I was already familiar with; I was not at all familiar with Chemical Research International or Chateau de Clairvaux. I quickly scanned the rest of the information on the sheets, and then noticed where Judy had highlighted in yellow felt pen the name I'd asked her to cross-check with her records. On each list, the name of Adolfo Verde appeared as Chairman of the Board—and as the majority stockholder.

"So he really is carrying the collection plate to the corporate level," I said without looking up.

"That's not the half of it. His organizations are huge, international in scope. Protection Service is based in New York, but a good chunk of their earnings comes from overseas. The same goes for the Research arm in Houston. And then there's the winery. It shows the greatest growth."

"And their main plant is near Solvang in California—next to the order's monastery headquarters. Makes sense in a traditional way," I said.

Our waitress arrived and, as she left with our order, a thought that had been bothering me surfaced. "You show this huge growth in the Chateau? Even now?"

"Well, yes." Judy then made the connection. "Maybe he doesn't have a direct hand over the acquisition machinery," she finally said.

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I then decided that I would be needing the rental car for one more day.

As the rented green sedan rushed north over U.S. 101, Rob was still complaining about being pulled out of bed at five in the morning. I was getting tired of telling him that if he hadn't had his amplifier up so loud the night before, he would've heard the phone. Jefferson and Lynette, who was between computer programming jobs, sat in the back seat watching the exits pass by.

Eventually I turned left onto State Highway 246, a narrow two-lane road running inside the Santa Ynez Valley. I knew we were in the right place when I began seeing the trellises; hundreds of them, on a mild upward slope to our right.

Farther up the gentle slope was a sharp rise to a higher plateau. The rise was terraced and covered with more vines. As we turned right to get onto the main dirt driveway of the Chateau, I saw that there were buildings, large ones, on the plateau. And, from the vineyards to the plateau, cables ran between three tall arched supports—a skytram, carrying gondolas up and down the rise.

I pulled the car into a dirt parking lot near the start of the steep rise.

"So what's the plan?" Rob asked, getting out of the sedan.

"It's a simple one." I looked toward the rise, watching large clusters of tourists enter the wrought-iron gates and from there wander around the vineyards, or up to the plateau in the skytram. "We're just here to play tourist, and find out what we can about the order."

There was a small building behind the main gate, into which we were shuffled with the rest of the arriving visitors. Behind a counter a young man—late teens, I guessed—in a long brown robe was taking names in a guest book, and telling people where to start the self-guided tour.

Jefferson looked troubled. "What's up?" I asked him.

"Something feels wrong. Up," he said.

"Up?" I said.

He shook his head, as if unable to explain. It was our turn at the counter. The monk looked at us carefully as I signed us in, and we began the tour.

The tour wound its way out of the building, finally ending up at the base of the rise at the first of the large metal supports. Another monk, also in a brown robe, was there. "From here, you take the gondola up to the main plant, where the actual pressing and fermenting take place."

The gondolas were of a simple design, holding about two dozen people each. It was a counterbalance system, with one gondola heading up the slope as the other headed down. We got into the car.

I took Lyn aside as soon as we entered. "Something doesn't seem right. Can you check on it?"

She nodded, and sat down on one of the benches ringing the interior of the gondola below a metal hand-rail at waist level. There was a slam as the monk slid the door shut. Moments later, the cable that ran across the top of the gondola tightened, and we began to move.

The view was incredible. In the distance I could even see the Santa Ynez

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River. But I wasn't enjoying the view as much as I should have been.

"Oh my God."

I whirled around to look at Lyn. "What?"

"It's the gondola," she said quickly. "The part of the cable that's about to go through the support."

I glanced up through the transparent top-half of the car. We were approaching the half-way support.

I thought fast.

"Listen up, everybody," I said, projecting my voice as calmly as possible. A dozen heads turned my way. "We're getting near the half-way point. I'd appreciate it if you'd all please sit down and grab on to the hand rail. The car tends to lurch a bit when it passes through the support."

Thank God people listen to what they think is authority.

The car lurched all right. But it did so before the support. It was accompanied by a grinding sound, and then all hell broke loose. I managed to grab the hand rail before being thrown on top of an elderly woman.

"Rob!" I shouted. "The pulleys in the support! Weld them!"

I held on, and concentrated as well as I could on pushing the pulley guides for the cables together, the only thing that would keep the cable from going completely slack and dropping the gondola onto the scenery below. In front of me Rob was hanging on to the same hand rail, staring at the support.

"Done," he said simply.

I relaxed, and felt pangs of hunger shoot through my stomach. The car still tilted, but thanks to Rob fusing the metal cable with the metal pulleys, we weren't dropping any more.

There were a few bloody noses and black eyes among the other gondola passengers, but nothing appeared more serious than that. Some of the tourists were staring at the ground a good distance below, and the predominantly brown-robed crowd gathering underneath the gondola on the terraced hillside.

One woman stared at us. "Can you get us down?"

"We'll try," I said. Sliding the door open, I looked down and tried to gauge the distance. This was not going to be *fun*.

By the time I had lowered all but the four of us, only brown robes could be seen below, the tourists having been walked to the bottom of the hill. I was beginning to feel pretty weak by now, but I got the other guild members down safely, although not as gently as I'd have liked. Finally, I stepped out, concentrated, and let myself hit the ground in a heap.

As I stood I heard a groan. The monk who had approached Rob had neatly hit him in the back of the head, and he crumpled. Lynette and Jefferson were suddenly in motion.

I did what I could, mentally pushing Rob's attacker into two other monks. But while they were not armed, there were more of them than us. I saw a large man run toward me with his arms raised, and I concentrated hard. Then I did what anyone weak from hunger and exhaustion would have done. I passed out.

Cold. Hard. All in all, not a very pleasant way to end a nap.

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I heard a voice drone on near me, and considered opening my eyes. Then I recalled what had led to my unscheduled nap and decided against it.

I heard feet shuffle in front of me and felt I should at least risk a peek. I was looking at legs, about three or four yards in front of me, legs that belonged to the standing figures of Jefferson, Lynette, and Rob.

From the angle, I guessed I was lying on my side on the floor. I could see that Rob's head was wrapped with some kind of cloth. All three of them, and—I tested my hands behind my back—I, had our hands tied.

Through my slightly opened eyelids, I focused past my colleagues. We were in a large room with white walls and a high, wooden ceiling. Off to our right were several islands of gleaming metal canisters, all with metal bands on them about two-thirds of the way up. The bands also gleamed, but with frost. They were fermentation vats for the wine; we'd seen photos on the tour. To our left stood three football-player-class men wearing brown monk's robes. They seemed to be unarmed. They were also standing directly in front of the only door I could see.

The drone came again, and this time I pinpointed the source: another brown-robed figure right in front of us. But this monk, although over six feet tall, was middle-aged and could be measured in diameter, not just height. Unlike his cohorts', this one's hood was thrown back to reveal a balding scalp bordered on the sides by thin, brown hair. The eyes, too, were brown, and piercing. In his right hand he held what appeared to be a brandy snifter. I resolved to keep looking as unconscious as possible.

". . . a pity that Mr. Michelenie can't be with us in mind as well as body," the drone resolved itself into words. "Too, a pity that Mr. Walton can't watch without his asbestos headgear. But then, if he could, he could make things a little hot for all of us, agreed?"

The figure chuckled at his bad pun and took a sip from the brandy snifter.

"Who are you, anyway?" The question came from Rob.

"The Most Reverend Adolfo Verde of the New Bernardine Order, of course. And despite the best efforts of some of my brothers," he glanced at the three guards, who didn't react, "you have indeed made it to the winery. I'd hoped the slight flaw in the gondola cable would have taken care of the matter."

"How did you know you wanted us? For all you knew, we're just another bunch of tourists," Lyn pointed out.

"The guard you incapacitated at the L.A. brewery has an excellent memory. He reported the incident to his superior, who then made sure it got to me. All it took was a couple of phone calls to the guild to verify who you were—and then we watched for you."

Then it *was* Verde who was behind whatever was going on at the Brew 202 plant. One question answered. But as I looked at those fermentation vats behind him, something nagged at my memory. I felt it was something important.

"So why . . . and how . . . are you doing all this with the beer and wine? Doesn't it hurt your own business?" Rob asked.

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The laughter boomed throughout the large room. "Very good, very good," the monk chuckled. "Right to the point. Well, there's no reason not to tell you now." I didn't like the way he put that.

"As you can tell," he said, raising the snifter in our direction, "I happen to enjoy the finer things in life. Some would say too much so, and that narrow-mindedness cost me a nice Roman Catholic Church career."

I thought back to what Rob had said about Verde's falling-out with the church. His Most Reverend self was a lush.

"It was simple getting followers. Preach clarity and a new world order to confused youth, and they'll follow you anywhere. With their money, I set up the winery. Then, by selling a little stock and setting up boards of directors with well-to-do but unimaginative men, I started the chemical labs and the security guard service. They were all successful."

"But what has this got to do with the Drought?" Rob asked.

"Insistent, aren't we? Very well. Don't tell me you didn't learn anything from your encounter at the brewery?"

"The capsules," Jefferson said.

"Back when I established Chemical Research International, I had a plan. That plan produced a new variety of enzyme, one that attaches itself to alcohol molecules. There it lies, inactive until it enters a specific environment: the human bloodstream. Then, when a certain predetermined concentration of alcohol molecules presents itself, the enzyme becomes active, neutralizing any further concentration of alcohol in its environment."

"Wait a minute." Lynette looked thoughtful. "You mean this enzyme would keep alcohol from building up past a certain level?"

"Precisely!" Verde was grinning. "And no matter how much alcohol one consumes in the beer or wine, you get only slightly tipsy before the enzyme starts to cancel the alcohol's effects." He walked over to the vats. "The process was such that it worked only on fermentable spirits, beer and wine. Distillation inactivates the enzyme in the harder liquors. The enzyme binds to the molecules in the stage where they were being formed: that is, from sugars to ethyl alcohol during the fermentation process. All we had to do was add our little capsules here," he pointed to the vat, "and let it alone."

Again, the vats. I kept trying to remember.

"From this point," Verde was saying, "it was quite simple. Using a cheap pool of labor—namely, my converts—I was able to establish a security guard service that would undercut the bids of any other. Of course, we specialized in the protection of breweries and wineries, worldwide."

"But why?" Lynette said. "You still haven't answered that."

"When people aren't buying wine or brew any more, the holdings of the makers of those products go down in value. Any takeover bid is looked at very eagerly. And we're expanding." He sipped again from the snifter. "Funny how when we acquire all we want, the Drought will mysteriously . . . dry up. Not, of course, before leaving me in an excellent position to bring my Cause to everyone."

Taking over the world economy

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through beer and wine didn't seem like the most foolproof way to conquer, but I had to admit it was the most original plan I'd heard in a long time.

Then I remembered. Those vats were open on top, to let the carbon dioxide gas escape as the yeast inside the vats heated it to fermenting temperatures. Those frosty metal bands were actually a cooling system to keep the vats from getting too warm from the yeast reaction and fermenting the wine too quickly.

I hoped my heat source remembered as much of the tour as I did. I got to work.

Verde had returned to his original position directly in front of us. "It's a pity you won't be around to pray with me when all of this finally comes to fruition," he said. He waved his hand, and one of the guards flipped a switch on the wall.

A large, pastel green garage door began rolling up on the wall behind Verde, revealing a winery truck outside. "We use this to transport equipment, usually."

"What are you using it for now?" Lyn said quietly.

"Another type of cargo. Just four pieces. They're heading to a nice, quiet place, for a nice, long fast."

What I had done didn't require much energy. It had only taken a little pull to separate two of the layers of asbestos cloth covering Rob's eyes. Not enough to make his eyes visible, but enough for him to get a bearing on what was across the room. I slowly had pointed his head in the direction I wanted.

He had taken the hint. While the guards and Verde had been watching us, I had watched as the frost disappeared from the metal bands around the vats. I had begun to channel.

From the open tops of the vats, down the mental corridors to two very small reception points I had channeled: one bubble around Adolfo Verde, the other around the three stooges.

Now I held my breath, and held the channels of carbon dioxide together.

Verde turned back to look at us after answering Lyn's question. Then he appeared bewildered for a moment, and fainted dead away.

The shattering of the snifter on the concrete floor got the attention of the guards. But as they started to race to Verde's aid, I kept the bubble on them. They made it three steps, I counted, before they too met the concrete after running out of oxygen.

"Rob," I said, sitting up, "the bonds." He burnt the ropes that held our hands together, and Jefferson strode toward Verde, turned him over, and struggled to remove the monk's garments. The rest of us followed suit with the guards' outfits.

The winery truck started right up. We wound down the terraced hillside at an agonizing—but normal—pace. We dropped Lyn at the rental car, then ditched the truck about five miles down the road when Lyn caught up with us.

All the way back to Los Angeles, we looked over our shoulders.

It didn't take much to put Verde out of business.

After being briefed, Evavold called a news conference to outline what "her sources" had told her about the Drought. It was just a bizarre enough news story to get a lot of play.

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A good number of beer and wine producers decided to play it safe and found new security services. When suddenly their product was potent again, others followed suit.

I, of course, let some of my friends in law enforcement—as well as the other guild locals—know about what we'd discovered, and when the old security guards packed up, there were search warrants waiting for them. The capsules found on the guards matched very nicely with the capsules seized in the raid on Chemical Research International. The grand jury was enjoying itself.

Verde himself was in no real position to do anything. After coming to, he soon found himself facing some very angry boards of directors, wanting to know where all the research and development money had gone.

And me?

I sat with my feet up on my desk in our Wilshire District offices. I was grinning.

So were the three others in the room. A week after the showdown near Solvang, it was payday. And Evavold — kickback account or not—had lived up to her word.

After the others left, I was starting to lean back into my chair to regard the sunset when I realized there was still one loose end, one person, I hadn't checked on yet.

As usual, I was out of breath by the time I got down the seven flights of stairs. The dirty glass double doors swung open with a creak, and as I walked out into the twilight, I tripped.

I looked behind me to see Fred. He was leaning against the entryway wall, passed out wth a bottle of Ripple in one hand. I sighed, and recalled Fred's suspicions.

Once again, the world was safe for democracy. ■

● Next month's issue features two noteworthy novelettes. John Schoenherr is doing the cover and Val Lakey-Lindahn the interiors for Jayge Carr's first cover story, "The Kidnapped Key," a colorful tale about a uniquely nasty dictatorship's brush with galactic civilization. And Ray Brown's "Credos" is really the first in his popular "Reformed Sufi" series, even though we've already published others, because this one goes all the way back to the origins of that sect and its peculiar interaction with the technology of matter transmission.

Stephen A. Kallis, Jr., has a brief but timely article on a special kind of intelligent probe that might be used for planetary exploration. "State of the Art" makes its first appearance in some months with Joe Haldeman's reflections on the state of Soviet science fiction as observed on his recent trip there. As usual, I can't say *exactly* who will appear with short stories, but we have some waiting by Robert L. Forward, Eric Vinicoff, Ian Stewart, and Hilbert Schenck. We'll do as many as possible next month, and save any that are left over for later.

IN TIMES TO COME

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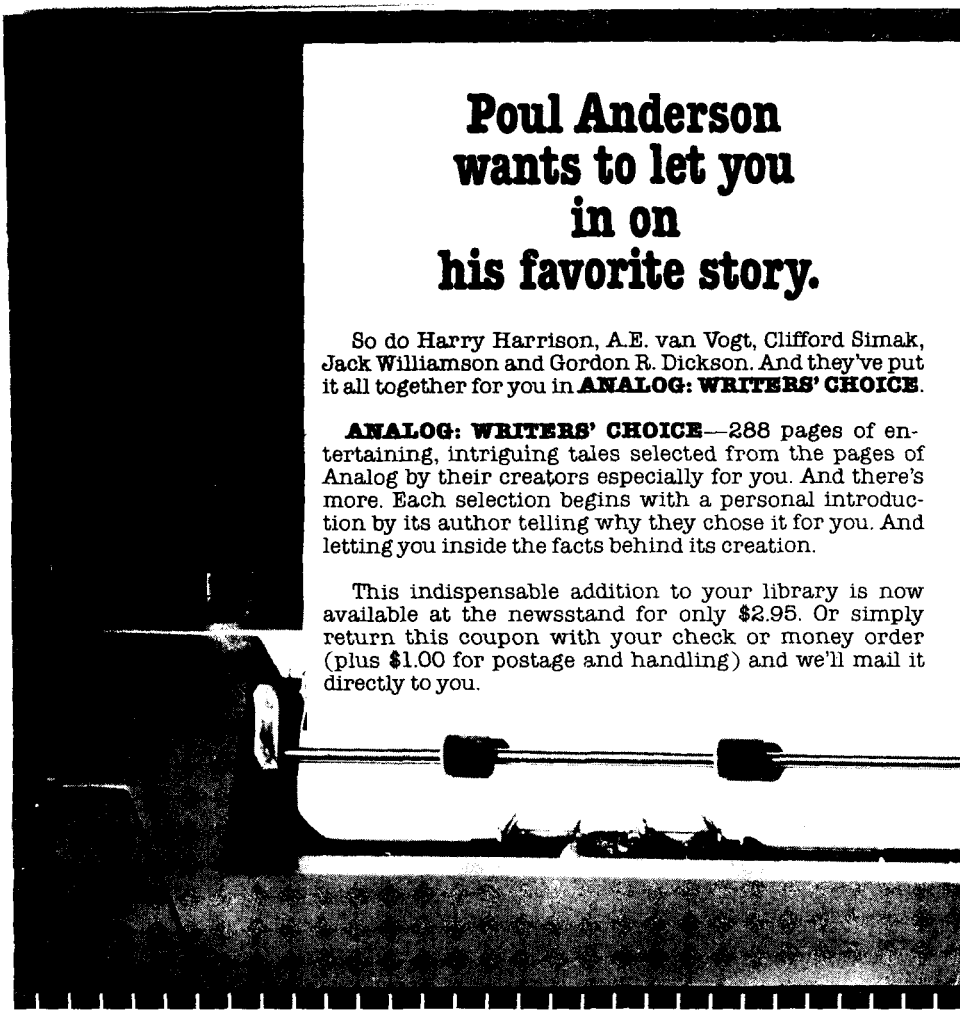

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the reference library

By Tom Easton

The Complete Poems of Ray Bradbury, R. Bradbury, Ballantine/Del Rey, $2.95, 277 pp.
Special Deliverance, C.D. Simak, Ballantine/Del Rey, $2.75, 217 pp.
Retief to the Rescue, K. Laumer, Timescape, $14.95, 238 pp.
Crystal Singer, A. McCaffrey, Ballantine/Del Rey, $2.95, 311 pp.
Hart's Hope, O.S. Card, Berkley, $2.75, 272 pp.
The Hanging Stones, M.W.Wellman, Doubleday, $11.95, 172 pp.
Wall Around A Star, F. Pohl and J. Williamson, Ballantine/Del Rey, $2.95, 288 pp.
The World of the Dark Crystal, J.J. Llewellyn (illust. B. Froud; designed and edited by Rupert Brown), Henson/Knopf, $25.00, 128 pp.
The Tangled Wing, M. Konner, Holt, Rinehart & Winston, $19.95, 543 pp.
Deep Space, C.A. Ronan, Macmillan, $25.95, 208 pp.

As I sit down to write this, Christmas is just ten days away. You read it in May, and in just two or three more months, this magazine will offer you coupons with which to order Christmas gift subscriptions. Think about it—if every one of you bought one gift subscription for Uncle Fred, who used to read SF but no longer has the time, you'd double *Analog*'s circulation in one jump. You would also get off cheap at least once—a subscription makes a *very* economical gift—and give considerable satisfaction.

Why am I shilling for the magazine? The immediate stimulus is that this year I bought three gift subscriptions, for two brothers and a friend—Hi, Mike! Hi, Chris! Hi, Jim! (For me, it beats writing letters.) For an afterthought, if I can convince you, the mag will prosper and maybe the rates will go up. That's good for the writers. If the rates go up, the mag will attract even better fiction, and that's good for you. So, do yourselves a favor. Give *Analog*.

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A second afterthought, and one that ties my pitch to book reviewing in general, is that giving gift subscriptions to SF magazines might well expand the SF audience. Up go book sales. Up go rates. Up goes quality. And last but not least, maybe, up goes the positive view of the future, space, and alternatives that we associate with SF fans, but not with more mundane folk, such as legislators.

Some of you will want to know: **The Complete Poems of Ray Bradbury** is now out. It incorporates three earlier books—*The Haunted Computer and the Android Pope, When Elephants Last in the Dooryard Bloomed,* and *Where Robot Mice and Robot Men Run Round in Robot Towns*—and a new introduction. Here Bradbury reveals that at least some of his poems are quickly written, in minutes rather than hours, days, or months. He thus stands outside the poetic tradition of endless reworking, and it is perhaps a marvel that his poems are as good as they are. Some strike me as quite good indeed. Others don't—they seem overblown, in need of that reworking, of condensing and refining.

Do you want the book? It depends, doesn't it? I think his prose, especially in his earlier stories, far more potent and evocative than most of his verse.

Clifford D. Simak's latest is **Special Deliverance.** In its future world, the welfare system is financed by slot machines. Everyone feeds them quarters, with no real hope of a jackpot, but with a righteous conscience. Professor Edward Lansing quizzes a student who has produced a paper on Shakespeare that is just too good and is told of a certain slot that provided it. Lansing goes to the machine, finds it talks, collects one filthy story, two keys, directions to another machine, and a kick in the ankle. He follows the directions, uses the keys, collects a jackpot of strange gold coins, and is transported to an alternate Earth. Simak makes all these mysterious doings seem reasonable enough. Lansing accepts talking slots even though they are totally outside his experience. Bemused, he doesn't flap—until his campus suddenly becomes forest. Then he panics briefly before settling down again to follow a path to an inn where he meets five others. The six, it seems, are a team assembled to pursue some undefined goal. Lansing, with his jackpot-laden pockets, is the team's treasurer. A robot, akin to those of *City*, is the team's strong back, at least until it is injured.

What is the goal? All they know is what the innkeeper tells them: teams assemble in his taproom before leaving to follow the road, down which lie a giant blue cube and a ruined city. Lansing's team follows suit. The cube, when they reach it, is an enigma, doorless, surrounded by boobytrapped sand. It seems obvious as a goal, and when the team flees it, the reader is frustrated. A little more patience and intelligence—of exactly the sort the team's two survivors display at the end of the story—would end the tale immediately.

My objection is hardly unique to this book. A great many novels impose artificial difficulties between a problem and its obvious solution, largely to make the story possible. When they do, they weaken themselves, albeit they do then have plenty of time to develop character and portray worlds. Simak uses his stalling in just this way, and he does it well. Yet he still irritates, the more because the final end seems both obvious and trite, so dependent on his neighborly outlook as to be pollyanna-ish. His tales are better when he makes them more complex.

* * *

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Keith Laumer's Retief is a favorite character—jaunty, iconoclastic, unimpressed, reasonable, neighborly (though not in Simak's fashion). However, Laumer may be giving him too-large assignments. A case in point is **Retief to the Rescue,** which worked *much* better as "Truth or Consequences," first published in 1966, and reprinted in 1982's *Retief: Diplomat at Arms*. Laumer padded it outrageously to reach novel length, and not carefully. Whatever he needs to keep the story moving, he tosses in, explanations and consistency be damned. A spaceship disguised as a wreck turns out to be a tank disguised as a spaceship. Human (or sentient) identities and allegiances shift at will. Confusion reigns, and Retief's charms are lost in the mire.

Avoid it, even if you simply dote on Retief. If you do dote, *Rescue* may well cure you.

Anne McCaffrey's **Crystal Singer** is not as involving as some of her past tales, but it is still good. It rewards the reader. We begin with a young music student, Killashandra Ree, whose voice is not quite good enough for the career and fame she aspires to. Told this at her final testing, she says, "The hell with it!" and walks away from a past dedicated to music. What will she do now? She has no idea, until she meets Carrik, member of the Heptite Guild on Ballybran, Crystal Singer, cutter of the stones that make interstellar civilization practical. He has glamor, status, and wealth, and his job calls for Ree's own musical skills. He warns her—vaguely—of the job's hazards, but she barely hears him. Old friends warn her too, that Ballybran devours mind and soul and even life. She sees the effects in Carrik, too much like those of heroin withdrawal, but still she must go to Ballybran, and go she does.

Finally admitted to the Heptite Guild, Ree finds both that Crystal Singing (or Cutting) is a skilled art and that she has a talent for it. She will go far in her newly chosen field. The symbiosis with a local microbe that gives Crystal Singers vitality and longevity and ties them to Ballybran has taken its best form with her. She has a sense for high-grade Crystal. She has a destiny within the guild. She *is* the prima donna she yearned to be in school.

Ballybran, world of Crystal and symbiotes, seems unlikely, as do the Crystals themselves. They are almost unlikely enough to turn the story into fantasy, but not quite. Strange enough technology may seem magical, but technology it remains, dependent on human hands and minds.

Killashandra Ree, on the other hand, seems quite likely indeed. She is every youth who ever sought a "calling," and found it around some unexpected corner. Here it is that the book rewards the reader, for it shows us how the called are driven. It does it well, and it reminds us that time spent before the call is never wasted. Ree cannot thrive as a musician, but the years of training before her failure are necessary for her success on Ballybran.

McCaffrey also reminds us that true callings are rare. Other Singers seem less dedicated than driven, like midnight slot machine addicts. Non-singers are mostly complacent in their careers, believing one equivalent to another, able too easily to urge Ree to stay away from Ballybran. Most of the exceptions are political fanatics, a parallelism that is surely no accident.

I've sometimes wished that I could find a calling—or a fanaticism—of my own. It would offer a certainty and strength no dilettante can know. It might even save me from the curse of reason-

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ableness, one I suspect is too familiar to SF readers and writers—and editors, Stan? Then again, the called *are* unreasonable. They don't compromise well. Perhaps we can blame them for all the political and philosophical intransigences that blight our world. Can't we?

Orson Scott Card's **Hart's Hope,** an expansion of a *Chrysalis 8* story, offers us a calling of a different sort in the realm of fantasy. In a world whose gods are the Hart, the two Sweet Sisters, and God, once lived a wicked king and his daughter, Asineth. Palicroval, one of the king's lords, rebels, kills his master, weds Asineth by rape, and exiles her in his mercy. She bears his child, learns magic, and uses the child's blood to gain awesome power. This power she uses to oust the rebel husband from his capital and enslave his new bride, his general, his prime wizard, and the gods. Her husband and his allies she afflicts with sundry boils and cramps. The people of her regained city she rules lightly. The people of the land beyond she leaves to Palicroval.

And so it goes, for three centuries, until the gods manage to engineer for Palicroval a son, Orem Scanthips, Hart's Hope. In time, Orem reaches Asineth's city and discovers his power: he is a Sink, with the ability to neutralize all magic at will. He uses it to save his world, but first he must become Asineth's "Little King" and sire a son on her. He does not know it till near the end, but she plans to kill this child as she did her first, to preserve and maintain her power.

Card tells the story in a novel, effective way. The narrator, unidentified until the last page, is addressing a finally victorious Palicroval, trying to dissuade the man from killing Orem, who had occupied his throne for a time. The narrator's approach is through a series of tales, reminders to Palicroval of past history, supplies of new information, bids for sympathy and understanding. Many of the tales stand more or less alone, in form rather like myths or legends. The book thus feels ancient—not antique, nor archaic, but more like a volume of fairy tales. It seems a far more effective vehicle for fantasy than the more usual style that tries to present the fantastic as if real.

Manly Wade Wellman is back with **The Hanging Stones,** another Silver John novel. Here John climbs Teatray Mountain, on whose flat top a would-be millionaire is building a copy of Stonehenge, with tourists and dollars in mind. John soon discovers that there are degenerate locals who do not like interference with their own local sacred site. Too, they are werewolves.

In the end, the werewolves are defeated by a corps of the original Stonehenge's builders, brought into the present by a "white" magician. John is largely an onlooker, a vehicle for the rich local color and song we expect from Wellman. He brings us very little of the Appalachian arcana we have seen in past yarns, and we miss it.

Has Wellman run out of steam with Silver John? I'd hate to think so, for I like both character and style. Yet earlier stories seem more vigorous, fresher, at least in memory. Perhaps the next will suit me better.

Frederik Pohl and Jack Williamson have finally done the sequel to *Farthest Star,* which introduced the strange body Cuckoo, a world with the diameter of half a solar system, roaring through intergalactic space toward the Milky Way. Cuckoo is populated by a myriad savage species. It is orbited by well-armed

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forts, unmanned and unapproachable, and by a satellite constructed by the Milky Way's varied sentients, among whom *Homo sap* is very small potatoes indeed. From the latter, humans *et alii* study the mystery of Cuckoo in vain.

In **Wall Around A Star,** linguist Jen Babylon is summoned to unravel records that may have been left by Cuckoo's supposed original, vanished natives. He leaps the light years by tachyon transmission, a process which puts a copy of him aboard the Cuckoo orbiter while leaving the original home on Earth. The story follows both personae. At Cuckoo Jen finds a chaos of plot and counterplot. At home he observes the rise of an "end of the world" cult that proclaims Cuckoo as imminent salvation, and the emergence from the sea of strange glassy crabs. Eventually we learn the crabs are slaves of Cuckoo.

At Cuckoo Jen discovers that the strange world was built—a Dyson sphere—in another galaxy and that its operator is still present. What are this operator's aims? If I say, I give away too much. Let me comment only that Pohl and Williamson use their transport gimmick to touch on the question of identity of original and copy, seem to decide that both act, feel, and are real, with all appertaining perquisites, and at the end throw their decision out the window. Copies are copies, and we needn't worry about them. To be fair, though, there is a turn of phrase you may take as an authorial butt-cover.

The story is active. The characters are monstrously varied and sometimes intriguing, though often cartoonishly one-dimensional. The title proves to have a neatly biological appropriateness. The tale is cosmically portentous. It could succeed well on TV or film. Yet—yet—it lacks something. The chaos at Cuckoo is hard to believe. The social scene is more like a zoo than a congress of intelligences. Motivation and subtlety are missing. I can't quite recommend the book as more than an evening's light entertainment.

The World of the Dark Crystal is a coffee-table curiosity. It's heavy on art by Brian Froud (*Faeries*), and his is the name on the cover. The text, by Oxford Prof. J.J. Llewellyn, is somewhat in the Tolkien spirit, though more pedantic and less charming. The book offers a dream-inspired translation of a text derived by meditating on a mysterious inscription. A world inhabited by Gelflings (and others) is blessed by an enormous, mystic crystal. At some past time, it was invaded by powerful creatures who wished to use the crystal's powers to split their good and evil sides into separate bodies. They succeeded, the crystal went black, and ensuing history was a tale of torment for the Gelflings. Eventually, the last two Gelflings embarked on a quest for the one way to restore the crystal, banish the aliens, and cure the world.

They succeeded, and the movie *Dark Crystal* (unreleased as of column due-date), has at least the potential for great success with its puppets (by the Muppet man, Jim Henson). However, if the movie takes after the book, it will be labored, obvious, and heavy-handed. It will offer none of the joy of a Tolkien. In the book, at least, the professor dominates, adorning a sketchy myth-like tale with stuffy asides on history, artifact, and philosophy. The spirit of the artist is submerged—nay, swamped—for all the obvious intent of the packager.

Card's attempt at myth-making is more convincing, for all that his book contains no artwork at all. Mock history is a difficult game to play, and perhaps

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the professors should leave it to the writers, unless they are in fact writers themselves, with a better sense of balance. I find much more satisfying the professor who chooses to dance his way around true knowledge, as Harvard's Melvin Konner does with the biology of behavior in **The Tangled Wing: Biological Constraints on the Human Spirit.** Konner is an anthropologist concerned with the old debate over nature and nurture. How much of human behavior is wired-in, innate, dictated by the genes? How much is acquired or influenced by experience? The answers to these questions, he tells us in a lengthy, fascinating, reflective discourse, are not simple. Clearly, nonhuman behavior is strongly influenced by genes—dogs can be bred for timidity *and* aggressiveness. Just as clearly, learning plays a strong role as well. Yet research makes it clear that much learned behavior is learnable only because the genes prepare the animal to learn certain sorts of things more easily than others. We inherit tendencies, readinesses, capacities, not programs. At the same time, much behavior is under the control of specific neural circuits, wherein nerve cells communicate with each other using specific chemicals, or neurotransmitters. Genes can interfere with the amounts and functioning of these substances and throw behavior off, as in schizophrenia and depression.

Konner writes in a popular tradition, well established by Ardrey, Fox, Tiger, and more. However, he has no real axe to grind. His view is more even-handed, his style more literary, his results more broadly edifying. He outlines genetics and physiology, considers the mechanisms of speech and feeling, goes into the specifics on rage, fear, joy, lust, love, grief, and gluttony, and turns finally to the changing of behavior, future prospects, and the role of awe, or wonder, of which the SF fan is so fond.

Konner tells us his book grew from a course (or courses) at Harvard. He makes me think that course must be marvelously provoking, a gem in Harvard's crown; one no student, in whatever field, should miss. I recommend it, and the book as well.

Finally, I have Colin Ronan's **Deep Space,** an amply illustrated encyclopedia of astronomical phenomena. It has chapters on scale, the astronomer's tools, space itself, galaxies, motion, gravity, universal evolution, and life. The book is organized as a series of relatively short discussions, much in the fashion of an encyclopedia. The detail is ample, but the level of the language makes it seem best suited to younger readers. Perhaps this book's proper niche is the high school library.

To be honest, I did not read it through. I skipped: perusing, glancing, checking, gathering impressions. I was impressed, despite occasional editorial sloppinesses, as in the line, ". . . to behave the same laws. . . ." The coverage seems complete, accurate, and even "user-compatible." ■

● It is deliberate and discerning love of our nation that appeals to me, not the indiscriminate love that assumes that everything be right and righteous because it bears a national label.

Thomas Masaryk

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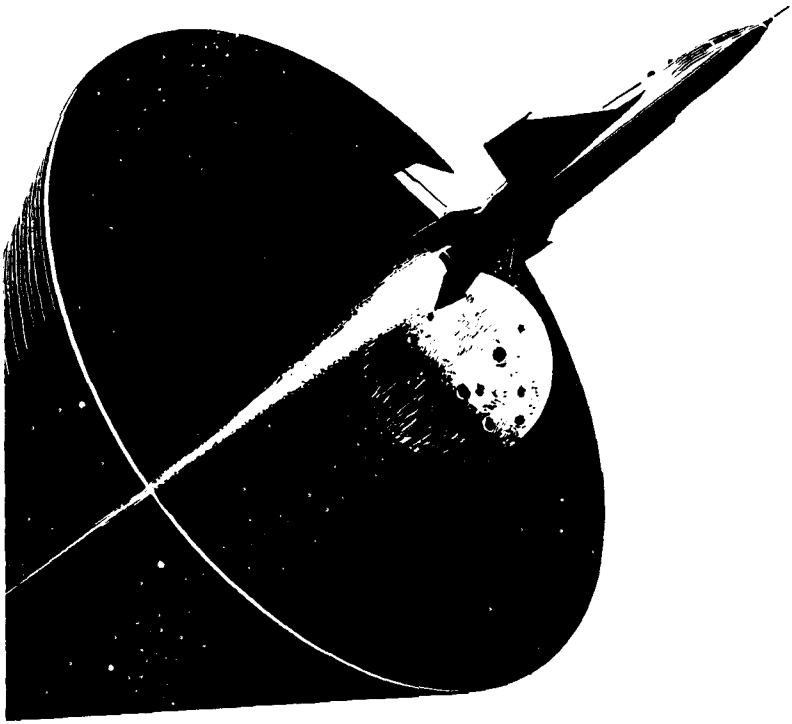

MANNA

Conclusion

Lee Correy

Removing the wants which have driven many historical conflicts should make such conflicts obsolete. But the effect is far from instantaneous, because the responses of social systems usually lag well behind the facts.

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SYNOPSIS

I'm **Alexander Sandhurst Baldwin,** *but please call me* **Sandy.** *After the United States Aerospace Force cashiered me, an Academy graduate, because I ignored policy and shot down a Soviet space fighter to save myself, I answered an ad for an aerospace pilot and found myself in the United Mitanni Commonwealth on January 1, 2050, as they were celebrating 50 years of nationhood. I happened to be in the right place at the right time to prevent the assassination of* **Vaivan Vamoru Teaq, Alichin Nogal Vamori,** *and* **Omer Kolil Astrabadi,** *"The Mad Russian Space Jockey." Since they had placed the advert, I found myself accepted into their circle in the strange free-market culture of the Commonwealth, which had been founded by Ali's grandfather,* **General Anegam Dati Vamori,** *otherwise known simply as "The General." In a teleconference I learned more about the inner workings of this successful free-enterprise culture based on The General's "abundancy economics," a philosophy directly opposed to that of the world of scarcity and limits which had predominated for centuries. These people believed their adversaries were not other nations, but multinational power groups.*

But I got the feeling that a few of them—financial experts and bankers such as **Heinrich von Undine, Kariander Dok,** *and* **Tonol Kokat,** *remained primarily interested in the age-old goals of money and power.*

Terrorist assassination attempts continued, one of which I foiled. Terrorist arson caught all of us in Karederu Center, and The General was badly burned. **Dr. Tsaya Chiuila Stoak,** *an attractive but quiet young woman, insisted on rehabilitating The General in the hospital facilities of the L-5 space complex, so Omer and I—accompanied by Ali, Tsaya, and The General—made an emergency flight there.*

Although I'd seemingly been fully accepted by these people, I really didn't understand what role I could play in their complex affairs. I didn't even understand the Commonwealth and all its unusual cultural quirks. It was a low-tech country in the mid-21st century, yet these people acted as if they were playing in the main tent. But I admired them for refusing to knuckle under to pressure of any sort from hi-tech world powers. I became more familiar with Commonwealth business affairs, military matters, and morals as Omer and **Dr. Ursila Peri** *familiarized me with commercial aerospace piloting. I found myself strangely attracted to Tsaya Stoak, but I made major blunders of etiquette with her; still, she gave me one of her hand weapons, the short iklawa dagger with which all Commonwealth citizens were armed. Although I had some trouble accepting The General's abundancy-economics principles, I knew that the economic pressures put on the Commonwealth at the Santa Fe Space Commerce Conference would eventually lead from economic warfare to armed conflict. The General apparently was impressed with my background and ability to analyze the Commonwealth's military situation, and he appointed me his military deputy until he healed from his burns.*

Meanwhile, organizations who were trying to economically cripple the Com-

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monwealth managed to shut down powersats supplying Commonwealth supporters with their electrical power. The Commonwealth companies responded by initiating energy warfare, assigning power beams to these rectennas from Commonwealth-owned powersats while at the same time preparing to build additional powersat units. I knew that failure of economic measures would lead to armed conflict, and I was worried about one ten-gigawatt powersat which had been pulled off-line and was therefore available to provide power to one of the secret five-billion-watt orbiting space-to-Earth lasers—hell beamers—I knew the Aerospace Force had in geosynchronous orbit. With Ali, I visited the headquarters of the Resident Inspection Organization, an unarmed paramilitary force charged with reporting diversion of any powersat's output to military weapon uses. There I got to know Inspector **Peter Randolph Rutledge,** *RIO second-in-command, an extremely intelligent former Britisher who was aware of the potential necessity of transitioning RIO to an actual pannational military force, should the possibility of space warfare become certain.*

As the complex situation developed, Ali and I were called back to Earth. The Commonwealth's scrambled security communications system had been compromised, apparently from within. As we searched for ways this could have happened, I became more involved with the Commonwealth's military defense posture and plans. I tried to convince the Indunos—general officers of the Impys (armed services)—that the Commonwealth faced no overt invasion, but would be harassed by terrorist and guerilla warfare. Induno **Kivalina Moti** *of the CitImpy, the trained citizen reserve force, was the only one who believed me. On a rail trip to the potential trouble spot of Kulala, Kivalina and I found ourselves embroiled in one such terrorist incident, involving a hijacked food train. While attempting to dislodge terrorists from a critical control building on the Cape-to-Cairo Railway, I was wounded. Omer flew a hazardous rescue mission to bring medical help.*

As I was recovering from my wounds, Vaivan decided I should assist the Impy Indunos rather than handle the extremely critical space operations that I was better qualified for. When more guerilla raids brought the Commonwealth to a state of military alert, Omer and I sneaked out of the country. But it didn't look as if it would be easy to thread our way through the military situation in space. The world apparently was in the final stages of a military build-up and alert that could presage a general war more horrible than a thermonuclear exchange, because of the more powerful space laser weapons. I had to prevent Space War Two while keeping my newly adopted country from being defeated in both economic and military conflicts.

There I was, flat on my back at 30,000 meters, nothing between me and the ground but a thin regulation.

I'd invoked a seldom-used International Aerospace Regulation that harked back to Earth's oceans, upon which a ship captain was an absolute monarch responsible for himself, his ship, and

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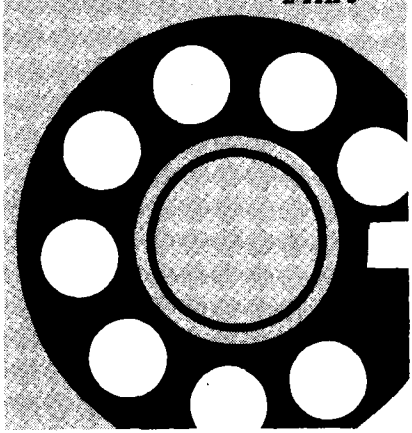

everything in it. It had been carried into the air by a rule that made the "pilot-in-command" solely responsible for the safety and operation of his aircraft, regardless of what traffic coordinators told him. I'd told the space traffic people that I'd fly without their help.

STC Centers would continue tracking our beacon to keep other spacecraft clear of us. Military trackers would do the same in case we broached their engagement zones, which would mean Trouble for the *Tomahok*. Avoiding an engagement zone isn't difficult—*if* you know where it is. Space is mostly empty.

I'd waived clearance while still under ascent thrust on our original trajectory to a 200-kilometer parking orbit. Our delta-vee margin was excellent. We had a lot of leeway in changing our flight path because the *Tomahok* had "bulked-out" before she "grossed-out"—that is, the hold was filled long before we attained maximum weight. The cargo was—would you believe it?—cotton underwear.

Clothing wears out, and the clothing industry hadn't been established in space yet. Spinning, weaving, dyeing, and tailoring are ancient technologies, but among the last to be moved into space.

"Russkie, I hope the League data's good," I told Omer. "Display our current flight path and the projected positions and engagement zones of other sky junk."

A blinking blip indicated a polar orbiting satellite. Our parking orbit would broach its engagement zone.

"There's our problem," I said. "AmSpace Command recon bird. That's why the amended clearance. We'll burn

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out of parking orbit to miss him. What are the options?''

Omer punched the keypad. The screen displayed a series of trajectories. ''Take high delta-vee option. It will be obvious we're avoiding the reconsat.''

''But we may run into trouble with this one, Omer.'' I indicated another target. ''It's displaying no code. What is it?''

Omer queried the computer. ''Not in League data. Unknown. Let it be for now. We handle when time comes,'' advised the Mad Russian Space Jockey. ''We take problems one at a time. Sandy, get us in parking orbit and watch engagement zones. I work on vector for transfer orbit to Ell-Five.''

Our burn out of parking orbit came as re-programmed. While we were under thrust, we got a sensor alarm. ''Targeting lidar!'' I snapped. ''Aerospace Force has seen us closing on the reconsat.''

''We go laser-hard,'' Omer said, reaching for the switch.

''Negative!'' I snapped. ''They'll interpret it as a countermeasure and try to burn us.'' I indicated another target on the display. ''That's annotated as an unspecified military satellite, but it's a ten-megawatt hell beamer.''

''Hokay, so we do a little tsig-tsag! Give me controls!''

I did and Omer called out his actions. ''Tsang plus-x ten meters per sec.''

I got a surface temperature warning signal. ''Warning shot without a call. That's not SOP!'' The Aerospace Force tapped the data stream from the world STC net and knew who we were.

''We did not broach engagement zone of reconsat, and now they see us burn into new trajectory. So we are out of hard place under rock for moment. You fly now.''

Low Earth orbit zone is tricky to work in. Velocities and closing rates are high. There isn't much time to detect, track, make decisions, and maneuver. It's full of sensitive reconsats that can't defend themselves or maneuver. Such unmanned sky-spies are considered expendable scouts. Everyone knew where everyone else's were, and nobody bothers them for fear of retaliation.

Hell beamers are another matter: they're unmanned with auto defenses. Unless they spotted the proper beacon password—which we didn't have — they'd shoot at anything that broached their engagement zones. We *had* to stay clear of those. We'd been lucky this once.

Some that looked like hell beamers weren't; they were decoys or legitimate R&D space telescopes. If you wanted to find out whether one was indeed a hell beamer, you had to make a hands-on inspection—which was *very* risky, not only because of the auto-defenses, but because some of them were booby-trapped.

Nobody liked the hell beamers, especially the League of Free Traders. But the low-powered ones in LEO were no threat to people on the ground. And nobody had been burned in space by them, so they were tolerated as a necessary evil.

Omer pointed to a moving target. ''Soviet Black Tiger deep space fighter.''

The Soviet pilot was maintaining a low closure rate and a respectable range.

''What do you think he's up to,

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Omer? We've got no beef with the Socialist Hegemony." Except the competing Soviet powersat proposal to China . . .

Omer shrugged. "I am Kazakh. I cannot always read crazy Russian mind. He's watching us, but so are unmanned Soviet facilities. Russians do not trust equipment or people by themselves. Must always have dual data from machines and from people. If people data not match equipment data, people data discarded in favor of equipment data. Russians are strange."

One would think that an aerospace "defense" team could act on receipt of danger data, but it couldn't. It had to get approval from a general or political leader. The principle of "dual phenomenology" ruled. Like their Soviet counterparts sitting under Smolensk and Magnitogorsk, the Americans under Cheyenne Mountain and Tincup required that two independent systems verify a situation. I'd been cashiered because of a flagrant violation of that policy and because "he's done it once, so he's capable of doing it again if he stays in."

But that operational philosophy saved our butts as we threaded our uncleared way through the maze of space weapons systems.

There was silence on the military freqs. All five military space powers were quietly observing us from their space watch centers. If we didn't provoke them, they'd probably do nothing.

"How about that Black Tiger, Omer?"

"Changed orbit plane with us."

"New target?" I asked, indicating a blip.

Omer shrugged. "*Nyet*. Same no-code unidentified as before."

"What is it?"

"Not Soviet. All *Kosmonautika* ships use beacon codes. Soviets always follow rules to letter, get others to do dirty work for them."

"Not American, either. The Aerospace Force follows the rules, too."

"I watch it."

"You do that."

Think of Earth as being at the bottom of a funnel-shaped well whose walls become less steep as you climb out of it. Paint the funnel walls in zones of different colors to represent the various space traffic control center jurisdictions. The ones nearest Earth, at the bottom of the funnel, are controlled from national centers that are, you hope, in communication with one another and swapping data. The ones farther out are watched by seven other centers located in GEO. And the ones in the nearly flat upper part of the funnel are four in number, centered on L-4, the Moon, L-5, and a huge "uncontrolled sector" stretching around lunar orbit from thirty degrees ahead of L-4 to thirty degrees behind L-5.

Now spin the funnel so the bottom part, representing a distance up to 50,000 kilometers, goes around once in twenty-four hours. Spin the top part from 50,000 kilometers' altitude out to a half-million kilometers at the lunar rate.

Located on the walls of this madly turning multi-colored funnel are marbles spinning around its surface fast enough so they don't fall down the funnel. Some of them are deadly marbles: come close and you'll burn. Others are

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big and fragile, but massive enough to destroy your ship if you hit one. Still others are ships like your own, plying space for fun, profit, or military purposes. An unknown number of the last are capable of whanging you with various and sundry weapons.

Your mission: without coming afoul of any of this, reach the flat tableland on top, then locate and dock to a group of flyspecks called L-5. Try it on your compu-gamer. Good luck.

The Black Tiger had a respectable range, but it sidled closer at a *very* low rate. Omer didn't lay radar or lidar on him for more than two pulses in sequence over a period of a minute. He said the Black Tiger sensors had difficulty discriminating those dual-pulse ranging blips from the howling storm of radar and lidar pulses bouncing around the Earth-Moon system.

The unknown target also stuck with us.

"*Tomahok*, this is Landlimo Prime," the comm speaker barked.

I recognized the voice. "Landlimo Prime, this is *Tomahok*. Hi, Vaivan!"

"You're supposed to be in the hospital, Sandy. What are you doing up there?"

"Helping Omer fly the unfriendly skies of Earth."

"He doesn't need you. He had another co-pilot assigned."

"He said his co-pilot overslept."

"The co-pilot was found drugged in the RON shack."

"I don't know anything about it, Vaivan. But Omer really needs me with all this military hardware orbiting out here."

"What's going on, Sandy? Woomera Center reported that you cancelled your clearance."

"Raise hell with them for giving us a clearance into the engagement zone of an American reconsat. And while you're at it, complain that the United States Aerospace Force shot at one of your ships."

"Sandy, you and Omer aren't following rules and procedures . . ."

"You hire two space jockeys, you think you get pussycats or tigers?" Omer broke in. "The General tells me if I think like slave I be treated like slave. If you want no-think order-takers, hire real Russians!"

"Just get to L-5, Sandy." She wasn't giving an order; she was expressing a wish.

We'd run a gauntlet of low-orbit facilities and were coming up on geosynchronous orbit. Although we were several degrees above equatorial GEO, where most of the civilian facilities were, we had to get through the web of military satellites in inclined GEO. Omer had the computer enhance the very weak returns from these stealthed facilities. We would come close to some, but not within their engagement zones—unless those had changed and we didn't know it.

That possibility didn't bother me as much as the Soviet Black Tiger nibbling at our track. I didn't know his motive, but he made his move as we neared GEO and the ball of yarn.

"He think we too busy getting through to watch him too," said Omer, as we watched the Soviet make a delta-vee burn.

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"Comrade Astrabadi, got any idea of his intentions?"

"Maybe he will have an accident with us."

"Our unidentified target has done something, too," I said.

Omer studied it for a moment. "He will intercept the Black Tiger soon. A Black Tiger is sensor-blind in aft hemisphere except for attack warning radar. Unidentified is now operating with radar stealth. We see him only on lidar."

"Watch them. I've got my hands full going through the ball of yarn."

But it happened before we got there.

The unidentified overhauled the Black Tiger. Suddenly the Soviet space fighter zanged sideways as if evading, but it kept going. The computer erased the old Black Tiger track on the display and flashed a newly projected track into the lunar sector of high Earth orbit beyond GEO . . . if the Black Tiger made it unscathed through the ball of yarn and the engagement zones there.

"I think he got a missile up his main engine," Omer observed quietly.

There was no Mayday call on any frequency and we never saw whether or not the Soviets sent out a rescue mission.

"Watch the unidentified, Omer. I've got to dive through our hole here." I spent the next few minutes trimming trajectory so our path went through an opening in the skein. If I nailed the center of our window dead-nuts, we'd be well outside any previously announced engagement zone.

We'd computed correctly, guessed right, and used the proper amount of Kentucky windage. We sailed through unharmed.

I must have breathed a sigh of relief, because Omer reminded me, "Sandy, is not all copasetic. Unidentified target came through same window two hundred kilometers behind us. Closing rate eighty meters per second. Intercept course."

Friend or foe? I didn't know. He'd gotten a Soviet space fighter off our track, but we hadn't seen how he did it. Now he was on our tail.

I used the international ship-to-ship frequency monitored by everybody in space, as well as by every STC center. I'd be heard by a lot of people, and that's what I wanted. I wasn't going to be blown out of space quietly.

"This is the commercial packet *Tomahok* of Commonwealth registry out of Vamori Free Space Port for L-5, beacon code one-two-seven-three. Hailing the unidentified space vehicle on an intercept two hundred kilometers behind us. Please identify yourself, sir."

A strange voice replied, "*Tomahok*, switch to frequency Echo Hotel."

Whoever was in that space vehicle knew the Commonwealth frequency codes.

"This is *Tomahok* on Echo Hotel," I broadcast on the Commonwealth channel.

"*Tomahok*, this is People's Space Navy cosmolorcha *Heavenly Lightning*. We are instructed upon request for contact and identification from you to transmit to you the kindest wishes of Wen-Ling Chung for a peaceful and successful journey."

"*That's* why they do not show beacon I.D.!" Omer exclaimed.

The People's Republic of China was not a signatory to the International Astronautic Conventions. They'd consis-

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tently boycotted meetings, claiming the Soviet Union and its Socialist Hegemony were hostile.

"*Heavenly Lightning*, this is *Tomahok*," I replied slowly and carefully in Basic Aerospace English. "Thank you, sir. Please return the regards of Sandy Baldwin and Omer Astrabadi to Wen-Ling Chung. What are your intentions, sir?"

"This is a training flight to translunar space. Request permission to pass within five kilometers of you."

"Training flight? Hah!" Omer exclaimed. "Chung has given us an escort!"

"Yes, but why? What's going on dirtside that we should know about?"

Omer shrugged. "Let Chinese escort us. It will discourage more hassle."

If the Chinese wanted to escort us, there was nothing we could do. It was armed. Cis-lunar space is no place to get whanged; it's a long time to anywhere.

"Permission granted, *Heavenly Lightning*," I replied. "Be advised you are within our zone of damage if we should have a catastrophic failure." The last was bluff. Nobody wanted to be near a space vehicle if it catoed, regardless of the cause. I didn't think they'd shoot, but I wanted to give them every discouragement; anybody who takes on a Soviet Black Tiger is a very tigerish tiger indeed.

"*Heavenly Lightning*, do you have any information about the Soviet space vehicle that passed near you?" I was hoping to garner some data.

"*Tomahok*, the Soviet ship had an accident. We were not permitted to assist."

That was all. We never got any more information.

The *Heavenly Lightning* crept up on us, decreased its closure rate, and was in visual range for almost twenty hours. We had a chance to get her visual, radar, and electromagnetic signatures on tape.

There wasn't much difference between the *Heavenly Lightning* and the old *Beikel* class. A hybrid like her namesake, the sailing lorcha, she was a black-and-white dart, looking like the paper airplanes we used to make as kids. Her design might be obsolete, but she'd managed to whang a Soviet Black Tiger. And she was on our side at the moment.

Sometimes old technology isn't obsolete. The seas of Earth are still being plied by the Chinese junk, a design that hasn't changed for centuries.

Because of the sensitive approach and engagement zones of L-5, I called long before it was necessary to do so. L-5 Center probably had the data on our squirrely flight track through the maze, plus that of the *Heavenly Lightning*. But I wasn't taking chances. No sense being stupid and getting burned after more than seventy hours of sneaky tricks and fantastic luck. No sense in pushing that luck, either.

L-5 Approach gave us a straightforward approach, but added, "*Tomahok*, we're painting you as two targets. Is another ship with you?"

"Affirmative. She's the Chinese *Heavenly Lightning* on a training flight to cis-lunar space. Are you experiencing difficulty communicating with her?"

"Affirmative. Be advised we may issue an amended clearance into an in-

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spection holding sector if she doesn't separate from you shortly."

As if on cue, the *Heavenly Lightning* executed a delta-vee burn into a new trajectory which our computer showed as passing well clear of the L-5 sensitivity zone.

I called ComSpat and informed Jeri of our arrival clearance.

"Roger, *Tomahok*. Ali says to tell you everything is copasetic in spite of his sister. And we're taping all approach data jay-eye-cee. Your anatomy is covered."

There was one more wrinkle. "*Tomahok*, this is Approach. United States Aerospace Force requests permission for a close approach to verify your configuration and markings."

"Let them," Omer advised. "They must cover their anatomy, too. They know ComSpat is taping. And Aerospace Force cutter pilots are good drinking buddies."

We watched a cutter swing out of a parking sector and set up an intercept. But we hardly had time to get a visual; it passed at a high rate, scanning as it did so, a procedure intended for a minimum exposure to hostile action.

We were home at Lagrange.

Ali was waiting for us in the portlock with Jeri and Tsaya. He looked relieved. "You had us worried."

It was like coming back from a hot run where I'd let it hang very far out. It was my nature to play Bruce Couth under those circumstances. "Worried? Why? We're cool."

Jeri sighed. "Space pilots!"

Omer grinned and brushed his mustache with his hand. "Hah! You just want clean new underwear, Jeri! Whole cargo hold full of it. We use none of it. Help yourself!"

I added fuel to the fire. "Must be pretty grim out here to ship a load of undies by packet. Or did they put you on short water rations so you couldn't use the laundry?"

"No, they started using too much starch in our shorts," Jeri said.

"Seriously," Ali put in, "you had us in a sweat. To put it bluntly, Vaivan was very upset when she discovered you'd left, Sandy. She's catching hell from the Defense Commissioner as well as from Wahak. I couldn't do much, but The General had a few well-chosen words with people dirtside."

"How's The General?" Omer and I asked in unison.

"Excellent," said Tsaya. "You can take him back any time."

"Great!" I said. "But not right away. We've been jammed in that can for three days. I want a shine, shower, shave, and shampoo, among other things."

"In good time." Tsaya took me by the arm. "Vaivan wants a full med check on you. Let's go to the infirmary."

There she inspected my scars. "Don't over-stress those leg muscles."

"There's no stress on them in weightlessness."

"True. But you're not back to normal yet. Your blood pressure and heart rate are elevated."

"I can't help that."

"You've been through a stressful experience."

"That's not the reason, Tsaya."

"I won't speculate. A diagnosis should always be based on hard data." She was

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still acting very professionally, but she took my chin in one hand and checked my eyes with the other. "Just as I suspected. Hyperexcitability caused by hypoaffection, a chronic malady affecting people who go down to the sea and up to the stars. Fortunately, it can be treated. Good thing, too, because it also affects those who wait, *moapa*." She spoke that word softly but with intense feeling. Cradling my face in her hands, she kissed me.

Tsaya went at something wholeheartedly once she'd decided to. Being both a medical doctor and a witch doctor, she knew precisely what to do and how to do it. I'd been shot at and hit, then chased all over the sky. Nothing makes a man more ready, willing, and able than being exposed to danger.

More than that, I wanted the love of this woman and to love her.

I wanted to tell her that, but I couldn't. Kissing Tsaya fully occupied me.

"You said I shouldn't overstress my legs," I reminded her when we came up for air. "How about the rest of me?"

"I won't overstress you. Sandy, *moapa*, next time please don't get hurt. Somebody cares about you, you know," she said softly.

"How could I know? You're wearing an iklawa."

Her iklawa clanged as it hit the bulkhead. "My love for you is now defenseless."

She really wasn't defenseless.

"What you did," General Vamori said, "was courageous."

"No, it just seemed the right thing to do at the time. On the other hand, what Omer did took a lot of bravery." We'd gotten some rest and were in The General's compartment for a social get-together.

General Vamori had completely recovered from his burns and acted like a much younger man, because Tsaya had done some reconstructive surgery he'd put off for years. "You confuse courage and bravery, Sandy," he observed. "Bravery is a defiant act against great odds; kittens are brave. But the word courage comes from the Latin word for 'heart,' and describes a conscious act based upon the moral judgment that it's 'right.' You and Omer exhibited courage in both Kulala and the *Tomahok*."

Omer sipped *supaku* from the plastic bag and shook his head. "Getting to Kulala and back was the only way to help Sandy. Coming out in the *Tomahok*, it was a big challenge to get from Vamori-Free to L-5 without help."

"And with two military space ships following us," I added. "We're not even sure what the *Heavenly Lightning* did to the Black Tiger. Omer thinks the Chinese put a missile up the Soviet's boattail. Whatever happened made the Soviet pilot change his mind about whatever he was going to do. I'm sorry we made the situation worse."

There were many twisty little international legal implications of the Tomahok Incident, as it was being called by the world press. It involved a possible attack on a military vessel by the military vessel of another nation, in which a third commercial vessel played no part whatsoever. It took place in "non-national space." None of the ships had operational safety clearances from Space Traffic Control, and were

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operating under detect-and-avoid rules. The *Tomahok*, being a civil vessel registered under the Commonwealth flag, wasn't open to attack by the Soviet ship, because no provocation had been given. And there was no way to know whether or not the *Heavenly Lightning* had responded to a provocation from the Black Tiger or if the Soviet pilot simply got the hell out of there. Nobody knew anything. Therefore, the news media had a field day analyzing, editorializing, and playing "let's suppose." None of this reflected any familiarity with the law of armed conflict, which holds regardless of whether or not an actual state of declared "war" exists.

As a youngster, I'd had the typical layman's view: "All's fair in love and war," the 19th-century German *Kriegsraison* doctrine which asserted that military necessity justified anything. The world clearly rejected that during the Nuremberg Trials. At the Academy it astounded me to discover there was a law of armed conflict. It isn't "law" as we ordinarily think of it. There's no central enforcement authority. The law of armed conflict is part of international law in which nations are the subjects, not individual persons as in domestic law. It's called the law of armed conflict because there hasn't been a formal declaration of war since 11 December 1941. When the U.N. Charter was adopted in 1946, nations formally revoked their sovereign right to use war to achieve political aims.

But this didn't stop armed conflict. Nations continued to justify it as an exercise of their right of self-defense against aggression. Nor did it stop terrorism or guerilla warfare, since it doesn't apply to "internal conflicts."

Because of the law of armed conflict and relevant aspects of international law, the Tomahok Incident didn't start a war.

The Soviet foreign minister presented a note to the People's Republic ambassador, claiming an unprovoked hostile act by the *Heavenly Lightning* and demanding compensation for damage to a Soviet vessel engaged in deep-space activities. He didn't say what those activities were.

The Chinese foreign minister replied that the *Heavenly Lightning* had been on a training mission, and expressed regret that there had been an accident involving the Soviet ship. He didn't say what the accident was. The Chinese government paid a small token indemnity without admitting that *Heavenly Lightning* had struck.

"The real reason behind the Soviet action and the Chinese reply is the powersat situation," Vaivan reported during a telecon. "When you cancelled clearance, the Black Tiger was assigned to stalk you for military intelligence purposes. The Chinese ship had standing orders to cover any Commonwealth ship being stalked by the Soviets. The Soviet reaction indicates they're showing military restraint because they hope to conclude the powersat deal. The Chinese are saving face and protecting their options."

"Those two nations have had a love-hate relationship for well over a century," I observed. "They're sparring as usual."

"Not exactly," Ali put in. "The Chinese get about a hundred gigawatts of their electrical baseload from ten

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powersats whose output they've leased from the Nippon Taiyo Denki Kaisha . . ."

". . . whose financing is handled by the Tokyo Foreign Investment Bank," The General finished. "Whose president is a member of the Tripartite steering council."

"Puts the Chinese in a tough spot, doesn't it?" I said.

"Will ComGlaser be able to divert enough output to pick up any of that baseload?" Ali asked.

Vaivan shook her head. "Not even a significant percentage of it. We've picked up the primary baseloads of those rectennas that PowerSat and InSpaPow pulled the plug on. Now there's no reserve."

"I'm concerned about what the Chinese may do if their rectennas lose power beams," I said. "I'm afraid of the Chinese Revanche, an American war college scenario. The Chinese have over two billion people to feed. To make maximum use of their resources, they use energy-intensive agriculture. Without space power they can't harvest, transport, store, or distribute agricultural products. They can pull through the coming winter with reserves on hand plus what they can purchase on the international market. Then they'll be forced to use less energy-intensive agriculture, which requires more land. They'll move to get it by going into the Amur Region, through the Irtyush Gap to Semipalatinsk, and along the Tien Shan to Alma Ata."

"A repeat of Space War One," said Vaivan. "The Soviets will use the same space beam weapon response."

"No, Vaivan," I told her. "RIO's operating now. It wasn't during Space War One."

"What can RIO do? Otasek's crews are unarmed."

"Don't sell RIO short," Ali advised. "Milan Otasek may be adverse to taking action, but Peter Rutledge has already gotten a strong message to PowerSat Corporation concerning One-Zero-Five-East."

I went on, "In any event, the Chinese will buy time by armed conflict if they have to. They may capture some Soviet rectennas. These will help their baseload needs after they string power transmission lines from them. When the dust settles, the cease-fire terms will probably include some internationally policed borders. If the Chinese win, we'll see the emergence of a new power transmission network in east Asia."

The General mused, "We may find ourselves in the middle of a Sino-Soviet confrontation, and I'm not sure we want to be there."

"Do you recommend we withdraw our powersat offer, Grandfather?" Ali asked.

"No, that would reflect poorly upon our integrity. I think it's time for me to return to the Commonwealth. I'll book passage for myself and my doctor aboard the *Andoric,* which is due to stop here the day after tomorrow."

"General," Vaivan said, "Sandy and Omer can bring you back in the *Tomahok*."

"No, they're needed here."

"I don't like it, Tsaya," I confided privately to her afterward.

"I don't either," she said. "It means leaving you, *moapa*. I'd be much hap-

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pier if you and Omer took us back. Then we might have some time together."

Two hours before The General and Tsaya were scheduled to go to the main docks to board the *Andoric*, a stranger four billion years old paid us a visit. It was an irregular nickle-iron object with a maximum dimension of about twenty-five millimeters. As meteors go, it was large. It punched through the ComSpat module's double-wall meteor shield and produced an eighteen-centimeter hole in the transit corridor linking us to L-5. The hatches sealed when sensors detected the pressure drop. The ComSpat module was isolated from L-5 for three hours while repair crews plugged the hole.

General Vamori and Tsaya Stoak missed the ship. The captain of the *Andoric* declined to delay departure; he had more than two hundred passengers who expected to arrive at Woomera on schedule. But the *Andoric* never got there.

The international board of inquiry eventually issued a report that satisfied no one. It will never be known why the *Andoric* and the *Borgholm* collided. Space is three-dimensional and there's a *lot* of volume to maneuver in, even close to Earth and deep in its gravity well. None of the 314 passengers and crew of the two ships survived. The STC traffic coordinators involved were useless in the inquiry. Two of them committed suicide before the inquiry convened, and three others, including a supervisor, suffered from psychiatric conditions because the guilt was too much to bear. The tapes showed that separate clearances from Brisbane and Gran Bahia were not coordinated. The ships were cleared right into one another at a closing rate greater than fifteen kilometers per second. The sensors in both ships probably rejected their data as being absurd. We'll never know, because the on-board recorders weren't recovered.

I suspected foul play, but dismissed it as paranoid. After all, who'd deliberately set up an "accident" that claimed 314 lives, just to get General Vamori? I couldn't bring myself to believe the Tripartite or any other power group could possibly be that ruthless.

Tsaya permitted herself to appear only mildly shaken when we got the news. She trembled slightly, bit her lower lip, said nothing, and disappeared. I knew what had happened. I went to her compartment.

It isn't a pleasant job to calm a hysterical person who won't otherwise permit herself normal emotions because of fear of the world.

I discovered myself beginning to share Tsaya's joys and griefs, her hopes and fears. I'd known and made love to many women, but I discovered I'd loved none before Tsaya. I had to include my mother; it came as a stunning surprise to discover that I'd never loved my mother nor had my mother shown any love toward me. With Tsaya, I began to learn that love is limitless.

But it took time. It didn't happen overnight.

Within hours of receiving the news of the *Andoric/Borgholm* disaster, we held another council of war. The term was used deliberately. We knew this was a *de facto* state of war, although there'd been only a series of disturbing,

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harassing, disconcerting, distracting, and apparently disconnected incidents against the Commonwealth, its facilities, and its people. We met without video because it wasn't necessary. An audio-only teleconference required less bandwidth and wouldn't be considered important by snoopers. The major matter was the *Andoric/Borgholm* disaster.

"I must consider it an accident," The General said. "It's not necessary to destroy two ships and hundreds of lives to assassinate me. In any event, the Commonwealth can win without me."

"We'd have difficulty winning without you, Grandfather," said Vaivan. "You're still our guiding light."

"I will not permit myself the luxury of self-importance," General Vamori replied flatly. "An inflated belief in self-importance and continual fear for one's life is a sure and certain pathway to the paranoia that's plagued national leaders and turned them into irresponsible conquering despots since Alexander the Great."

The General had put his finger on the reason I detested and refused to use my given name.

"Believe what you want, General, but we're going to protect you," said his son, Rayo Vamori.

"Very well," General Vamori said stubbornly. "But my enemies know where I am. If I travel in obvious fashion in an independent vessel, it will act as a deterrent against 'accidents,' because that ship will be well marked on every control display. If anything happens, people can be sure they'll be called to task for it. The telenews has made a big story of the fact that I happened to miss boarding the *Andoric*. Even if someone had managed to plan the *Andoric* accident, they wouldn't resort to such a thing a second time. Book me in a free trader registered under the Commonwealth flag."

"Don't you want Omer and me to take you home?" I asked.

The General looked pensive. "No, Sandy, we need you and others here because what happens will depend on what's done in space. That's our reserve of strength and power. It may well be that we're entering the last great world crisis in a period of great transition. And perhaps we alone embrace the new philosophy of a world of abundance gained by opening the skies above our planet. Even if, which I can not for a moment imagine, our Commonwealth were somehow subjugated and starving, as long as we have our people beyond the skies they will in good time with all their new power and might step forth to the rescue and liberation of the world itself."

I'd heard something like that before in a recording in a history class. Regardless of whether or not General Vamori was consciously paraphrasing those powerful words of the past, they still held enormous motivational power.

The General left within hours on the Free Trader *Arthur M. Dula*. Tsaya went with him. I didn't have time for a private goodbye. As a result, it was a cool, calm, professional farewell, because Dr. Tsaya Stoak resolutely maintained her strong defenses against a world she understood well enough to fear.

I didn't have time to mope about it. Three hours after the *Dula* undocked

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and broke orbit for the Commonwealth, I was with Ursila and Ali in his compartment, where they were keeping me from drowning my sorrows alone. Omer had gone out to do some proficiency training in the skalavans, and I was feeling blue over Tsaya's departure and worried about Powersat One-Zero-Five-East.

We hadn't gotten any word on One-Zero-Five-East for a long time, and a ten-gigawatt powersat off-line for anything other than maintenance or repair is something to worry about. We were counting on RIO to let us know if something changed.

They did. A priority scrambled telecom came through from GEO Base Zero and RIO Inspector Peter Rutledge. "Happy hour, eh?" Rutledge began. "I say, Ali, your scrambler is out of synch."

Ali shook his head. "Afraid not. Locked right in. Given the current state of affairs, somebody is tapping or jamming, or both."

"Won't make a bit of difference in the long haul." Rutledge went on. "But I hoped to pass the word to you on the Q-T. RIO has already notified InPowSat and PowerSat in scramble. We're proceeding according to operational priorities, and if InPowSat and PowerSat do not rectify matters bloody soon, we'll broadcast in the clear."

"Powersat One-Zero-Five-East?" I asked.

"More than that, old chap." Rutledge's veddy British mannerisms now were clipped and almost emotionless. "They've apparently developed a new computer program capable of altering the phasing of the transmitter arrays in very short order. The resident team on One-Zero-Five-East has reported tests of quick beam redirection. I have one of my spot check teams on the way for a look right now. It doesn't appear that there's been any power redirected, but from the way the beam's slewing we suspect it may be tracking some satellite in an inclined geosynchronous orbit. Sandy, would they be pointing at one of those American laser stations out there?"

"Probably, and it scares me, Peter. Now I'm going to scare you, too. I've told you there are Aerospace Force hell beamers in inclined geosynch. They're in three sixty-degree inclined geosynch points around the world for full global coverage. Each has an output of five gigawatts."

"I say!" Rutledge breathed. "Rather powerful! Why didn't you tell me how big they were before now?"

"You implied you knew."

"Perhaps I'd better start being less implicit and more explicit," the RIO inspector said *sotto voce*. "Aerospace Force must have some stealth measures I don't know about . . . those must be very large facilities for that energy level, and we haven't spotted anything big."

"They're small because they'll get their energy from ten-gig powersats."

"We should be able to spot any satellite receiving antenna large enough to accept ten gigawatts," Rutledge said.

"Not necessarily." It was Ursila Peri who replied. She had a Ph.D. in high energy physics, a fact she didn't talk about. "Powersat energy beams are limited in energy density for space-to-earth uses because of potential biological effects on the flora and fauna around the

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rectennas. This restraint doesn't exist for powering unmanned hell beamers in space. A powersat beam can have an energy density several orders of magnitude greater than the maximum allowed for space-to-earth power transmission. This permits the satellite receiving antenna to be small. I suspect a check would show that the beam transmitting antenna phasing at One-Zero-Five-East not only redirected the beam but narrowed it as well."

"Those big hell beamers mount small deployable receiving antennas that don't even show themselves until moments before the hell beams are triggered," I added.

"So that's why all of them in inclined geosynch look like innocuous recce or surveillance snoopers," Rutledge mused. "But what would anyone want with a hell beamer that powerful?"

"Selective targeting space-to-space and space-to-Earth applications," I said.

"But a hell beamer doesn't need *that* much power to be effective!"

"In space-to-Earth mode, it does."

"Sandy, it won't work space-to-Earth," Ursila objected. "The beam will spread too much for use against ground targets from geosynch."

"You've heard of adaptive optics?"

"Yes."

"And you already know the low I-R absorption qualities of some of the special alloys we're making out here for domestic use. Don't you think that technology can be stretched for military hell beamer use?"

"Probably."

"It has been. Don't ask me how; I wasn't privy to that data. I was just an Aerospace Force officer who had to know about the presence of such hell beamers so I could stay out of their way if things went toes-up. But those five-gig hell beamers can put ten-meter-diameter beams on the Earth's surface."

"But five billion watts! That's an absurd power level! It goes far beyond anything that would be required . . ."

"And it's quite contrary to the application of the law of armed conflict requiring economy of force, too," I pointed out. "Nevertheless, three of them exist. They're the modern equivalents of columbiads, block busters, and hundred-megaton thermonukes. They're blackmail weapons and considered as such."

"My God, why?" Ursila breathed.

"Because the Soviets have three big inclined-GEO hell beamers for the same purpose," I told her. "The Americans weren't about to be blackmailed if trumps were played in any future confrontation."

"I feel ashamed of Canada if it was involved," Ursila muttered.

"How about me? I used to work for the United States Aerospace Force!" I retorted. "It didn't bother me to know they were there to provide counterpieces in the American-Soviet chess game, but I never thought my former comrades-in-arms would stoop to using them against a nation like the Commonwealth."

"Or China," Ali added. "Or any other low-tech nation who refused to knuckle under to Tripartite economic pressures."

"Or against space facilities. We're sitting ducks," Ursila said.

"That's why The General believes the space segment of the Commonwealth is important," I said. "We've

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got to stop the potential use of those big hell beamers. And we're going to. Not tomorrow, but right now. Peter, we're coming down to meet with you and Commandant Milan Otasek. Regardless of international agreements that limit your RIO reaction, something's got to be done. It wouldn't be the first time in history that international agreements have been bent because they were unworkable when the balloon went up. Maybe you don't know what a five-gig hell beam with only a few picoradian spread can do, but *I* know!"

"But I do, and I must say I don't precisely like it," Rutledge admitted.

"I say, you Commonwealth chaps at L-5 must have propellant to burn!"

"That's what it's for," I replied to Inspector Peter Rutledge as we stepped through the portlock at GEO Base Zero and relinquished our iklawas to the guard. We'd come in the *Tomahok,* which wasn't economical, but she was fast and time was short.

"You heard the news as you came over?" Peter said.

Ali nodded. "We expected they'd cut power beams to Sri Lanka and Liberia, but not to Echebar, Selangor, and Sorat."

"As usual, telenews told the truth and nothing but the truth . . . but not the whole truth," Rutledge told us as he escorted us through the weightless halls of RIO Headquarters. "Ten minutes ago we broadcast on all warning frequencies that our resident inspection teams reported operating crews on ten more powersats belonging to PowerSat, InSolSat, and InPowSat redirecting power beams for reasons unknown."

"Is the military taking over the powersats?" Ursila asked.

"No, but every nation has some sort of emergency plan to be activated when it appears some sort of conflict is imminent," I said.

"I hope you understand the situation Commandant Otasek is in," said Rutledge. "This is the first alert broadcast RIO has ever made."

"It was bound to happen, Peter," I said. "With all the military hardware tearing around this planet, peace couldn't be maintained out here forever."

"I suspect not. But it's causing a lot of soul-searching among my personnel. If the balloon does indeed go up, a lot of our chaps are going to be in the line of fire."

"That's what we've got to settle," Ali said.

Commandant Milan Otasek of the Resident Inspection Organization was a large, full-faced, greying Moravian. He wore his RIO non-uniform with a strange combination of pride and offhanded disarray.

"Please, please, seat yourselves," he said with nervous hesitation, once his chief inspector had introduced us. Otasek was obviously under stress. He spoke as though he were not totally familiar with English, and carefully selected every word and phrase. As he did this, he had a tendency to pinch his lower lip between the thumb and forefinger of his right hand. "Inspector Rutledge tells me you wish to speak privately about the present situation."

There was silence until I realized I was going to have to run the show. "Yes, Commandant, we do. Has In-

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spector Rutledge reported what he's found and what I've told him?"

"Yes. A very bad situation. But we can do nothing about powersat One-Zero-Five-East and the United States gigawatt lasers. We can report only what we observe on the powersats."

"I'm a former officer in the United States Aerospace Force," I said, but without the pride I used to feel when I said that. "I'll confirm the stations are real. It's classified information whose disclosure is a capital crime in the United States. There's a price on my head for what I'm doing."

"Then why do you do it, Induno Baldwin?" Otasek asked, using my Commonwealth rank and alerting me that he and Peter knew what was going on at L-5 and Vershatets.

"The world needs to know, and you've got to tell it, because it trusts RIO."

"The announcement may start a war."

"There's going to be an armed conflict *unless* you do. It also means RIO will have to change to meet the new conditions. Otherwise, RIO will cease to exist, because the reasons for its existence will no longer be valid."

"Induno Baldwin," Commandant Otasek told me with a sigh, "I have a great dislike for war. My homeland for many centuries has been a corridor for marching armies. We learned that if we were to survive, we must not resist but must trade freedom for survival."

"You're no longer a citizen of your homeland, Commandant," I told him bluntly. "As the leader of RIO, you're a citizen of the world."

"You do not need to remind me of the oath I took twenty-five years ago. I have reported to the world that our teams have discovered that powersat beams are being redirected. That is the full extent of my responsibilities."

"That may be," I tried to point out, "but the original agreements which established RIO were made in simpler times, when an independent international inspection organization was needed to assure military commanders and business investors that powersats were not being used for military purposes. Times have changed. RIO's original job is finished. Powersats exist. All of the world's powersat companies and powersat-subsidizing nations have recovered their original investments."

I paused, then emphasized, "Commandant, I'm surprised you don't see and accept RIO's new responsibility to keep powersats from being used for energizing weapons."

"How would we do such a thing?"

"Take physical control of any powersat known to be redirecting its output to any space weapon device, then ensure that its power output is beamed to its assigned rectennas."

Otasek shook his head sadly. "That would be an act of piracy. It is beyond the scope of authority and outside the tradition of RIO."

"Have you thought about what will happen if you *don't*?"

"Commandant Otasek," Ursila spoke up for the first time, "I too come from a nation that doesn't like armed conflict but has fought for principle when necessary. The battlefields of Earth have seen far too much Canadian blood, but it was shed not only for Canada but for the principles of freedom we hold dear."

"I know the fine history of Canada,"

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Otasek put in. "I also know that you have a different view of these affairs than Induno Baldwin."

"Then please listen to it," Ursila pleaded. "The situation has escalated to the point where general war could begin. You may have the last opportunity to stop it. If you act, it will be not only in the highest tradition of RIO, but also of the decent human principles of civilization."

Otasek pinched his lower lip between his right thumb and forefinger and looked at Ursila. "Dr. Peri, you know something of high energy lasers. But I am no expert. I have a question for you."

"I'll answer it if I can, Commandant," she replied levelly, her voice and facial expression now empty of the emotion of her last statement.

"I have been told that high energy lasers based in geosynchronous orbit pose no threat to targets on Earth. If this is so, why is there so much fear of a five-gigawatt laser there?"

"I'll try to explain, Commandant," Ursila began. "Part of a beam's energy is absorbed and part is diffracted and scattered by the atmosphere. But a beam with very high energy density will self-focus and overcome diffraction and scatter. If it has high energy and narrow focus to start with, it can burn ground targets. Lasers of the power required to do this can't be placed in LEO; they'd be big because of their energy supplies and they'd be extremely vulnerable. So the greater protection of GEO is necessary. However, a several-hundred-megawatt beam that works from LEO won't work from GEO because even a few picoradians of beam spread prevents it from self-focusing. A beam energy of more than a gigawatt is required. Until recently, the lack of suitable materials has rendered gigawatt hell beamers infeasible.

"With the optics made from space materials, it becomes possible now to generate a five-billion-watt beam with such low dispersion that it *will* get through with enough energy to be a weapon against a ground target. There's only one source in space that can deliver the energy to power a small GEO hell beamer: a powersat.

"For the first time, the space laser is a threat to innocent people on the ground. The military use of powersats must be stopped! Otherwise, we'll be involved in Space War Two within days. That's why you must take control of any powersat whose beam is redirected from its known and assigned Earth rectenna." Ursila sat back. The color had drained from her face.

Commandant Milan Otasek seemed to be mulling over what he'd heard. Finally he said, "Alichin, Commonwealth Glaser powersats don't seem to be involved. Why do you feel threatened?"

"Because we may become the target of these weapons," Ali said. "Even if we're not the prime target, we wouldn't be treating our friends and customers properly if we didn't attempt to protect them for dealing with us rather than with those who cut off their trade in retaliation."

Again, Otasek didn't speak for a long moment. "This is a very complicated matter."

"All big problems seem that way," I told him. "The solution's simple. The

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alternatives aren't. Do what you must do, rules or no rules. Otherwise, none of us will survive the first few minutes of Space War Two out here where we're vulnerable to even the common beam weapons all around us. Think what a five-gigawatt hell beam would do in space!''

Again, a long pause. Otasek put his hands flatly on his desk. ''I cannot do as you suggest. I am the person who must maintain half a century of RIO tradition that has worked well. It has kept the world's major space energy source from being considered a military threat. Everyone in RIO has taken an oath relinquishing national ties and agreeing to abstain from physical involvement in the powersat system. The entire RIO structure of trust and believability rests on this. RIO cannot carry out its functions otherwise. We cannot become involved. I am truly sorry.''

''Otasek,'' I warned, ''if you don't act, there won't be any functions left for RIO to carry out!''

''That is not the responsibility of RIO.''

''Did it ever occur to you that RIO's responsibility now is the welfare of the people of the entire planet?''

''I am bound by international agreements and treaties that established RIO in the first place.'' It was obvious that Otasek could not conceive of permitting his organization to act beyond its original charter.

Chief Inspector Peter Rutledge moved over to the office door and threw the privacy latch. Then he turned to his commander. ''Milan, old chap, excuse me for discussing internal affairs in front of outsiders. But they're involved and they do indeed have a point. And they're friends, not adversaries. Milan, we've been through some sticky times together as RIO inspectors, so I don't feel out of line being rather frank at this juncture. It seems we're rather in a bind. I'm compelled to remind you of Operational Rule Twelve.''

''I am aware of the requirement to protect our people. I intend to evacuate RIO crews from powersats whose beams are being redirected.''

''How do you intend to do this, Milan?''

''Is something wrong with our RIO transport system?''

''No, but in short order I think it unlikely our vehicles will be able to approach *any* powersat. The RIO broadcast has brought everyone to a state of preconflict alert. Military forces are moving to protect the powersats of their national interests, and the powersat companies themselves are bringing in commercial security firms, as well. There's bloody little space here in GEO that won't be considered part of engagement zones. So I have a bit of trouble understanding how we'll get our people off before the balloon goes up. That's why I suggest you may be neglecting Operational Rule Twelve. Our people are in a sticky spot at the moment, Milan. Are you quite prepared to answer to the RIO Steering Committee for casualties?'' Rutledge spoke in a clipped, emotionless manner with the usual British penchant for understatement.

Commandant Milan Otasek pinched his lower lip again and replied, ''Hmm . . . if our RIO ships cannot approach powersats to take our people off, the

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reponsibility for their welfare no longer rests with RIO. Those who prevented us from removing them will be responsible."

"That may be somewhat of a moot point if and when those of us who survive have the chance to tot up casualties and damages. And don't you think we'd have a bit of a problem collecting reparations?"

Otasek said slowly and carefully, "RIO is an unarmed inspection organization. Once we have carried out our responsibility to notify the world of the military utilization of powersats, we have no authority to do anything else. If we are not permitted to take our people off the endangered powersats, we shall have to appeal to world opinion."

"That stands a bloody slim chance of protecting our people, Milan."

"I will ask the International Red Cross for assistance."

Rutledge shook his head. "Where are they going to get the ships?"

"I believe you are not correct in your assessment of the danger our people are in," Otasek said, taking another tack. "They are noncombatants. They are under the protective provisions of the various Hague and Geneva conventions."

"If the powersats on which they're based become military targets, our people will become 'regrettable noncombatant casualties.' You've run out of rationales, Milan."

"We cannot fight, Peter."

"We have to. We must be more than expendable sentries now. Too much depends on it."

"RIO teams are unarmed," Otasek reminded him.

"Really? Milan, weapons can be made from *anything*. How do you propose to keep RIO people from defending themselves?"

"They have taken the same oath as we have."

"I rather think the instinct for self-preservation may be a stronger imperative. We may lose some crews by mutiny. Either way, we're going to lose unless you act, Milan."

"I have no authority to act."

"Then, Commandant, as your chief inspector and second in command of RIO, I respectfully request you voluntarily relinquish your command authority to me because of personal inability to carry out Operational Rule Twelve."

"I cannot . . ."

"Then it seems I'll have to take it under Operational Rule Three. I hereby relieve you of command, sir!"

"This is mutiny, Peter."

"The RIO Steering Committee will be the judge of that, Milan . . . if I succeed. If I don't, it won't make any difference."

Rutledge's assumption of RIO command was quite emotionless and certainly non-violent, because of the personalities involved. Otasek was an imposing man with traits that had permitted his forefathers to survive generations of *Mitteleuropa*'s violence. On the other hand, Rutledge was cultured, friendly, and polite with an inner core that could be ruthless if the need arose.

Otasek pulled the keypad out of his desk and typed his resignation of command. Without a word, he transferred it into the RIO data bank, noting time and date, then requested a hard-copy printout, which he signed and handed

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to Rutledge. "I can only wish for you good luck," Otasek said with hesitation, his emotion showing only in his slight lapse into more of a slavic accent than he normally exhibited. "I must of course bring the matter to the attention of the steering committee."

"I trust we'll both survive to be present at the meeting which deals with this," Rutledge replied. "As it is, it'll be touch-and-go for a bit whilst I try to muddle through to victory." He turned to us. "I'm dreadfully sorry you were forced to witness this somewhat sticky situation, my friends. Usually we don't air our internal disagreements in the presence of others. However, I can hardly apologize without pointing out that you were the ones who brought it to a head. I'll see to it you're accompanied back to your ship, and I'll certainly keep you apprised of developments."

"What about powersat One-Zero-Five-East?" I asked.

"I think we can take care of the matter," the new RIO Commandant said. "I suspect the powersat crews would rather not become military targets. They're quite vulnerable, too. After all, the choice between being killed or being fired if they survive . . . Well, it's not much of a choice, is it?"

I asked, "Peter, do you need any help?"

He shook his head as he showed us to the door. "No, thank you, Sandy, but shall we see how things develop, eh? Actually, I'm not going to seize the powersat network. I'm going to take temporary control. The RIO resident teams will be instructed to see to it that power continues to flow to ground rectennas. We don't want to close the world down. That would cause more trouuble than a war."

"How do you intend to do it?" Ursila asked.

"Ursila, my dear, Milan Otasek was not aware of *everything* that went on in RIO. Although we're an unarmed paramilitary organization, we have study staffs working on contingency plans and the like."

It seemed too easy, too pat, too quickly done. But perhaps I'd overestimated the problem by assuming that only those of us in Landlimo Corporation and the Commonwealth had spent time thinking about the scenarios and options. After all, now-Commandant Peter Rutledge had turned out to be a rare combination of a thoughtful person and a man of action. He knew how to let it all hang out with tassles on it.

An RIO administrative officer guided us through the maze of corridors to the portlock where our ship was docked. We retrieved our iklawas, slipped into our ship, and closed hatches. It was only then that Ursila grabbed Ali and embraced. Then Ali grasped my hand and arm. "Good work, Sandy!"

"I didn't think it could happen!" Ursila was saying.

"We've won! *We've won!*" Ali shouted.

I held up my hand. "Keep a cool couth, folks. We haven't won yet. Rutledge has to bring it off. And we've got a lot of work to do on our own."

We boosted for L-5 and the RIO order came on our unicom printer:

RESIDENT INSPECTION ORGANIZATION HEADQUARTERS SPECIAL MESSAGE 200450 2130Z> RIO RESIDENT POWERSAT TEAMS

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HAVE BEEN INSTRUCTED TO REQUEST POWERSAT OPERATING CREWS DO NOT REDIRECT POWERSAT BEAMS FROM PREVIOUSLY ENERGIZED RECTENNAS AND TO RETURN ANY REDIRECTED BEAMS TO ORIGINAL TARGET RECTENNAS WITHIN ONE HOUR> POWERSAT OWNER ORGANIZATIONS ARE REQUESTED TO ISSUE THIS SAME INSTRUCTION TO OPERATING CREWS AND TO INFORM RIO HEADQUARTERS UPON HAVING DONE SO> THIS SPECIAL REQUEST IS BEING MADE TO ENSURE THAT POWERSAT BEAMS ARE NOT REDIRECTED TO ENERGIZE WEAPON DEVICES KNOWN TO BE EMPLACED IN EARTH ORBITS AND CAPABLE OF DESTROYING BOTH SPACE AND EARTH TARGETS> NORMAL SERVICE FROM POWERSATS WILL NOT BE AFFECTED> NORMAL SERVICE INTERRUPTIONS FOR ROUTINE MAINTENANCE OR REPAIR WILL NOT BE AFFECTED> HOWEVER POWERSATS WILL BE REMOVED FROM SERVICE BY RIO ACTION IF POWERSAT BEAMS ARE REDIRECTED OR ARE NOT RETURNED TO TARGET RECTENNAS AS REQUESTED> SIGNED AND AUTHORIZED P RUTLEDGE COMMANDANT PRO TEM> END MESSAGE> END MESSAGE> END MESSAGE> 200450 2133Z>

"Nicely done," Ali commented as he read the hard copy. "Very carefully worded."

I had to agree. "Peter didn't say how he'd react if he didn't get compliance. He was very astute to withhold his intentions."

"The big question," Ursila put in, "is whether or not the people of the Tripartite will believe RIO will do anything."

"They'll test Peter," Ali guessed. "They'll pressure him first. Then they'll conduct an experiment through some small and innocuous group. If the experiment fails—as I think it will—not much will be lost. That's the way power groups operate."

"So do military commanders," I told him.

The commscanner sweeping through the Commonwealth commercial frequencies stopped blinking and beeped.

I punched up the freq and said, "This is *Tomahok* replying on Hotel Quebec. Go ahead."

"Sandy?"

"This is Sandy Baldwin."

"Thank God! At last! This is Jeri at L-5. I've been trying to reach you for the last four hours."

"Why didn't you call us at GEO Base Zero, Jeri?"

"Couldn't get through! All channels were tied up."

"I can understand why. RIO's . . ."

"Sandy, smoke it back here fast!" Jeri's voice was strained with excitement. "There's been a revolution in Topawa! Kariander Dok and two others have taken over the Commonwealth government in a coup d'état!"

On the screen, they looked like a victorious triumvirate—Kariander Dok, Tonol Kokat, and Heinrich von Undine.

"You really have no choice, Alichin," Dok said with a smile. "We have Topawa and Oidak. It's only a matter of time before we secure the rest of the country."

"We control the primary seaport and the Oidak rectenna," Tonol Kokat bragged. "Our Freedom Army will take the Vamori Free Space Port before the day is out."

"Still fighting, eh?" Ali observed.

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"There's a lot of country out there you haven't touched yet, Dok. And 'Freedom Army'? Hah!"

"Mercenaries," I pointed out, recalling what Kivalina had said about how they tended to fight.

"Partially. Additional contingents will be pouring into Pitoika soon. While you were fretting over your neighbors and powersats, we had the opportunity to move unmolested to make a long-needed change in the Commonwealth. It's unfortunate you were the Commonwealth's representative in Santa Fe. A reasonable person would have seen the opportunity offered there. Your intransigence cost us dearly in terms of lost business. The three of us set about to rectify the situation. It took time, but we have friends in America, Japan, and Europe."

"You sold out to the Tripartite!" Ali exploded.

"You use terminology loosely," Dok said. "But enough of that. Now that the change has occurred, we must all pull together to get the Commonwealth operating properly."

"Having a bit of trouble, Dok?" I asked. "Some people resisting your new order? Your 'Freedom Army' fighting the CitImpy at every window?"

It was Heinrich von Undine who answered with agitation. "The CitImpy will not resist forever. Those who turn in their rifles and ammunition have full amnesty. Those who do not will be severely dealt with. I have brought in people to establish internal security police, and they know how to do this sort of thing well."

"I don't doubt that," I snapped. "They've had a couple of centuries of experience."

"I said, enough of this," Kariander Dok interjected. "We're extending to you the general amnesty offered to other citizens . . . with the exception of the Vamori, Stoak, Tatri, Teaq, and other ruling families who've held this country in their grip for so long."

"Dok, if this weren't such a serious matter, I'd laugh," I told him. "You're spouting your own propaganda like you believed it! You're right out of a 20th-century war movie!"

"For that remark, Baldwin," Dok sputtered, "you'll be stripped of your rank and power just like your boss, Alichin Vamori!"

"Kariander Dok, someday I'll eat you!" Alichin Vamori vented the oldest and strongest Commonwealth curse.

I scribbled on a scrap of paper, *Stall. Promise nothing. Let me evaluate the situation.*

"Ah, school boys passing secret notes to one another," Dok observed. "It's as childish as your anger. Lest we be misunderstood with regard to your family and others, we're not as barbaric as your curse. I came from one of the oldest civilized cultures where, in fact, civilization itself began. My colleague von Undine comes from an old European culture. We'd never consider murdering the leaders of the old regime. Arrangements will be made to free them without the means to regain the power they once used so badly."

Ali started to explode again, but I laid my hand on his arm and took over. "Dok, I'll admit this is a surprise. We're tired and hungry. Give us a few hours to get some rest. You owe us that

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much for preventing a space war that would have cost the Tripartite dearly."

I was stalling. I needed time to find out what was really happening down in the Commonwealth. Time to grasp the whole situation. Time to find out if Rutledge was succeeding. Time to organize the forces we had in space. Time to plan what we could do.

I hadn't forgotten what The General said before he left for the Commonwealth with Tsaya.

Tsaya! She was down there! So was Vaivan. And The General. And others I'd grown to love and admire, people who had the guts to tell the world to quit playing its old games because they'd discovered a world of plenty if others would only recognize it. Where were they?

Wherever they were, I knew they'd be fighting like hell if they were still alive.

Time. I desperately needed time, and I'd lick boots and kiss ass to get those three to give it to me. If I got it, I wouldn't waste a second of it.

On the screen, there was a hushed conversation among the triumvirate. Kariander Dok finally replied smoothly, "We owe you nothing, Baldwin. However, a short delay is harmless since our Freedom Army will have most of our objectives secured soon. You have eight hours to convince the citizens there of the wisdom of accepting the new government. I'll call you on this channel at eleven hundred hours."

When the circuit was cut, I thought Ali would go berserk. "My father! My mother! My sister! My whole family! Grandfather, and everything he's given his years to achieve! All because of those greedy monsters who were bought by the Tripartite!"

I put both hands on him to keep him quiet. But he had his iklawa out and in his right hand. Like all iklawas, it was sharp.

"Ali, sit down and shut up!" I shouted at him. "We don't know anything for sure yet! Keep your couth until we talk to someone other than Kariander's bunch."

"Get Omer! Get the skalavan squadron moving! Don't just sit there, Sandy! Do something! Move!"

The man was in shock. I put my life on the line and struck him across his face with the flat of my hand. The impact threw the two of us apart. I rebounded off the bulkhead a fraction of a second before Ali collided with the opposite one. I moved sideways because I saw Ali's hand come down. His iklawa rattled off the bulkhead where I'd been.

I grabbed a stool, ripped it loose from its velcro floor fittings, and held it in front of me. Then I pushed off toward him, driving hard with my legs against the bulkhead. Ali acted very surprised when I pinned him to the bulkhead.

This time I had my iklawa out with its point at his throat.

He acted as if he'd just come out of a trance. "Take your iklawa away from my throat. What do you think you're doing?"

"Trying to keep you from killing me!" I snapped, not moving my iklawa. "Get hold of yourself, or I'll zero you right now and haul you down to sick bay where we'll tranquilize you."

Alichin sighed. "I'm sorry, Sandy. I don't know what happened to me."

"I do. You've got to learn to control

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it when you let it hang out. Let's hope the rest of the people in the Commonwealth can let it hang out, too. There might be some hope for us." I slipped my iklawa into its scabbard and moved the stool aside. I was still prepared to break his neck if I had to.

Ali was breathing hard but had calmed down. "My apologies, Sandy."

"Forget it, Ali."

"Let's get busy. We've got to mount a space rescue mission to Vamori-Free. You and Omer can cover me; I'll pilot one of the packets. . . ."

"No."

"What do you mean? Are you backing out?"

"Ali, you're in no condition to do anything like that, even if it would work—which it wouldn't, because we don't know what's happening there. In fact, you're in no condition to lead anything, because you're emotionally involved and you've never fought a war before."

"I flew AirImpy tacair against the last Kangatu king in the Commonwealth Southwest."

"That was a police action. This is a civil war," I countered. "Wars aren't won by emotional generals *or* emotional civilians. For months I've been trying to figure out how and where I really fit into the picture. The General tried to tell me, but I couldn't grasp it because I didn't know what this was all about. Now I do. I know my role. I'll run this fight and win it. This is my show from now on. So follow me or get out of my way! Or I'll take off this iklawa. Peter Rutledge may need me if you don't."

Ali stared at me strangely. "Sandy, it's yours. You're the warrior. I'm just a merchant manager. You're one of us even though you haven't taken a Commonwealth name yet. So I'll give you one. I'm pleased you're with us all the way, Induno Sendi Boldwon."

"Sendi Boldwon?"

"When a person becomes a Commonwealth citizen, he usually takes the Commonwealth derivative of his name. My family name was once Van Mora. The family names Stoak, Tatri, Teaq, and even Hospah were derived from other names in other lands and cultures. Our forebears infused the best of their heritage into a common wealth of social background, but in a free society there can be no minorities. To become equal citizens, they took new identities behind new names altered to a common pattern. You were an American, but now you're a Commonwealther, Sendi."

I didn't feel any different, and I wasn't certain I wanted to be Sendi Boldwon. But if the rules required it in order to play the game, I'd go along. When in Rome . . . "Okay, make a public announcement that I'm in charge," I told him.

"Why? You are."

"You know from your management experience that assumption of command is impossible without an authoritative announcement from a person known to have the power to delegate the responsibility. People must be told who's in charge." That was straight out of the Aerospace Force leadership manuals. I didn't want to waste time and energy convincing the Commonwealth space forces that I was in command. Time was of the essence.

Ali made the announcement.

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Then I took over the comm console and called Jeri Hospah.

"Congrats, sir! Who do we kill first?"

"We're going to find out. Get me a circuit to Vershatets."

"Uh, fearless leader, the blasted freqs are jammed," Jeri reported.

"Is the lasercom installed yet?"

"It is, but we haven't checked it out yet. It may be useful only as an expensive flashlight."

"Try it."

Lasercom was practically jam-proof. A low-power beam would be less than three meters in diameter at a distance of 386,000 kilometers. Outside the beam it would be undetectable. If it was undetectable, it couldn't be jammed. It was working well enough for military use. I got through to Induno Kivalina Moti. She looked haggard, but brightened when Ali told her he'd put me in charge at L-5. "Good! We've got somebody running the SpacImpy! Eloy Chervit was caught in the Karederu Center round-up."

"What happened?" I asked.

Karederu Center had been rebuilt following the fire, and a rededication party had been scheduled. Kariander Dok and his gang used it as the occasion to launch the coup because it was an easy way to round up the Commonwealth leaders. But the triumvirate hadn't gotten all the key people. One of the last heavy storms of the season kept some people in Vicrik and Kulala. A coup d'ètat is like any other large operation: once the go-ahead is given, it's practically impossible to delay it forty-eight hours. This is particularly true if there's no contingency plan to handle a delay, and the Kariander triumvirate apparently hadn't had one. This told me their strategy was shallow and therefore vulnerable.

"Things are still confused," Kivalina said, "but it looks like they got the two Chairs of the Legislature, Justice Silut of the Jurisprudence Board, Commissioner Abiku, AirImpy Induno Dati, SpacImpy Induno Chervit, Shaiko Stoak of Commonwealth Glaser, and Wahak and Vaivan Teaq of Landlimo."

"What about the General and Tsaya Stoak?" I asked anxiously.

"They're here in Vershatets. We don't know yet where President Nogal is, so The General's acting as *pro tem* chief executive."

I was partly relieved. "We have a good chance of winning this thing, Kivalina! The Commonwealth leadership's been truncated, but it's basically intact and functional."

"Right! If they don't get The General, they can't take over the country."

"What's the current tactical situation?"

"I never issued a call-up to the CitImpy. They came out in a *levee en masse* after Dok announced the takeover. Vicrik and Vershatets are secure. The rebels tried to send an armed force up Dekhar Gorge in marginal weather without tacair. Our tacair flew anyway. The river ran red," Kivalina told me with understatement. "We'll retake Oidak and the rectenna tomorrow. Pahtu's pouring LandImpy troops up the Manitu-Oidak road and down Dekhar Gorge. I might add that she's doing it over my objections, because it's softening the defense points at Morosabi, Tewahk Pass, and Sidamu Pass. We're

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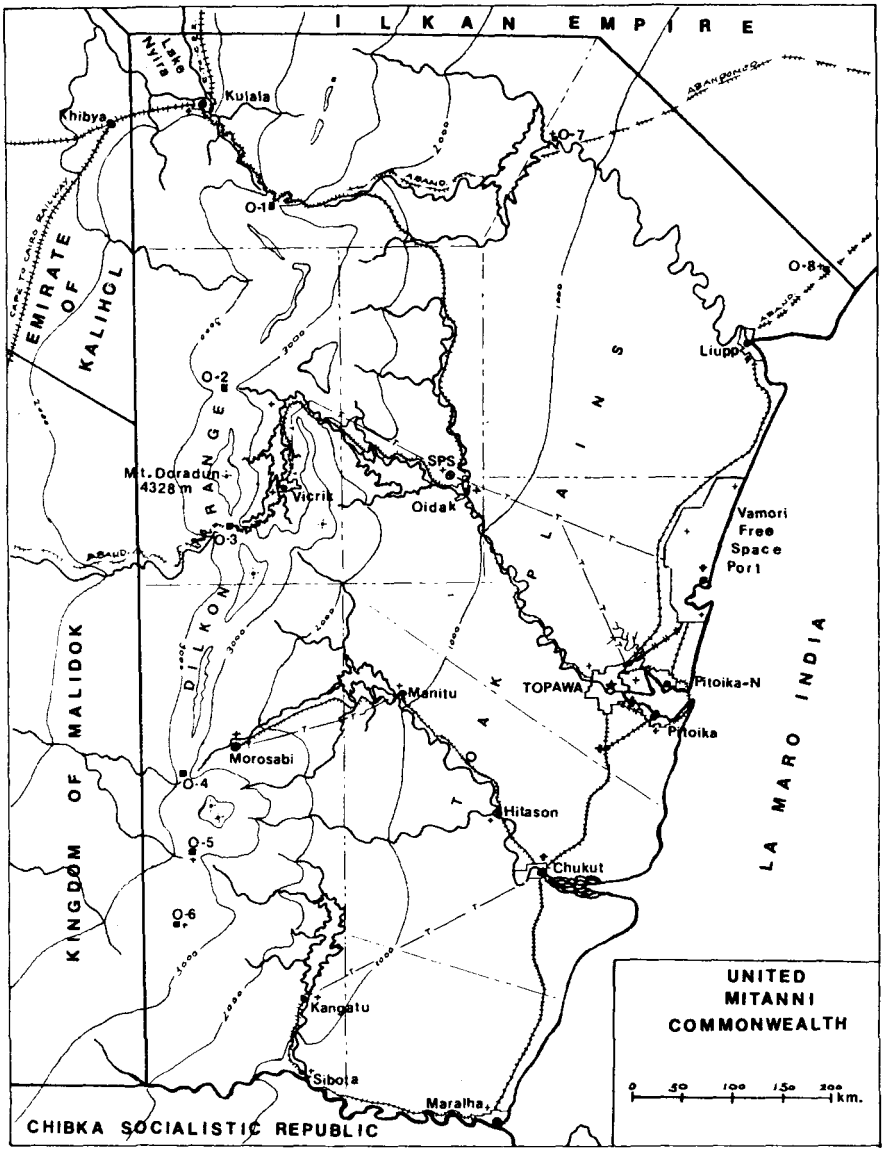

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leaving ourselves wide open to the Malidoks."

"Don't worry about them," I advised, "or about the Kulala region, either. Those were diversionary feints to distract us from Kariander Dok's activities under our noses. Kivalina, we *never* considered a strike from within! Everyone was so sure of our internal integrity that we forgot some people could still be tempted by greed."

"I don't understand it," Kivalina admitted. "After three generations educated under abundance economics . . ."

"Von Undine wasn't," I pointed out. "He's an outlander. He never adopted a Commonwealth name, did he? Incidentally, I think we'll discover Kariander Dok's an outlander."

"Didn't you know that? He came from Basrah and married into the Vamori family."

"The SpacImpy and our L-5 facility here is secure," I reported. "We can mount a mission to Vamori-Free."

"We've probably lost Vamori-Free temporarily," Kivalina said. "The mercenaries went after the major input facilities—the Oidak rectenna, Pitoika harbor, Topawa International Airport, and Vamori-Free. They don't have air superiority right now, so Topawa International's unusable. We'll get the rectenna back, and we can operate without the rest *except* Vamori-Free."

"If you and Pahtu take Oidak and the rectenna," I pointed out, "that will cut off power to Vamori-Free. I can take it back with a space envelopment while you and Pahtu keep them busy on the ground. If Dati's AirImpy can control the skies over Topawa International Airport and Shokutu's CoastImpy can bottle up Pitoika harbor, that'll prevent mercenary reinforcements from getting in. Then we'll go after Topawa. Does the strategy sound reasonable?"

"Yes, but let me get Pahtu, Shokutu, and The General in here. This has to be a closely coordinated operation, and there's a lot of staff work to do."

"Have the staff sit in," I advised, "then turn them loose to do their work against whatever deadlines we set. We don't have much time."

I got Ali, Ursila, Omer, and Jeri.

I was greatly relieved to see The General on the screen. "I was worried about you, General," I told him. "Too bad we still have to fight our own greedy people to keep them from looting what you built."

"Sendi," he replied with the vowel shift that indicated he'd seen Ali's announcement, "I never maintained we wouldn't have to defend our belief or our Commonwealth. Even after everyone understands there's plenty for all, it's going to take time for people to realize all the consequences. It'll take even more time to achieve the commonwealth of humanity, because that doesn't mean the existing wealth's spread commonly, but that everyone is commonly wealthy. But right now we have to save ourselves."

We went over the strategy Kivalina and I had discussed.

"As long as we hold the Dilkons and space, we've got the high ground," LandImpy Induno Pahtu pointed out. "We control communications, not the triumvirate. As long as we do, we'll beat them."

"We couldn't get through on r-f spectrum," Jeri pointed out.

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"We're jamming," The General told us. "We've deliberately left holes in the ECM so the mercenaries will be forced to use them and so we don't have to spend time monitoring a broad spectrum."

"Time's the critical factor," I pointed out. "The triumvirate used time in the form of surprise. We have to use time against them by acting faster than they think we can. What are we missing or neglecting? Anybody got a critique? Can anybody shoot holes in this?"

"*Da!*" Omer did. "We do not know where they are holding our people, and we do not know if they will use them as hostages."

"They will," Pahtu growled. "Dok comes from a culture that's utilized hostages often in the past century. As for von Undine, I've got to believe he follows *Kriegsraison*."

"They're holding my twin sister," Ali said darkly. "I know her as well as I know myself. I just *feel* she's in deep trouble. I want to find her."

"Ali, that's your job. You work on that," I told him. That would keep him busy. Ali would be ineffectual otherwise, because he had personal matters at stake which warped his judgement. I wasn't letting that happen—although I had personal matters at stake, too.

We got our various responsibilities and duties settled and established a schedule based on the speed with which Omer could get our skalavans together. I'd then have to be in the right place at the time with the ships we could gather. The retaking of Vamori Free Space Port would be a combined ground, air, and space operation, and everything hinged on the timing of the space armada coming in from L-5.

"As for the triumvirate's prisoners, the rescue will have to be a commando mission once we find out where they're being held and what's being done with them," I pointed out.

The General was considering all of this pensively. "Sendi, when did Dok say he'd talk with you again?"

"Five hours."

"They'll offer to parley," The General said, "because in five hours they'll know they're going to lose the Oidak rectenna. They may offer to negotiate through you since they don't have communications with us. They'll want to bargain. I think they'll offer the prisoners as part of the deal."

"I won't negotiate with human lives, General," I snapped.

"I don't ask you to. But I must remind you this is an internal armed conflict in which the various international conventions don't apply. There are no rules, Sendi. Do what you feel you must. Promise them anything but deliver them nothing. Stall for time and information about where they're holding our people. We'll be monitoring. In the meantime, let's proceed with the strategy we've developed, keeping in mind we must be extremely flexible. Many, many lives are at stake. If we make a wrong move, this civil war could still escalate into a worldwide general war. The Chinese have told me they're waiting to see what happens before they do what they feel they must."

I was apprehensive and anxious in anticipation of Dok's return call. I felt I was balancing the whole world on the

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honed edge of my iklawa. To keep cool, I recalled what I'd been taught about wars—the great miscalculations and mistakes as well as the high-risk chances that had become victories or defeats. I had to keep reminding myself that this war—and that's what it was, not a euphemistic "armed conflict"—would be totally different from any war fought to date. In recalling the lessons of history, I had to be careful I didn't fight it like any previous war. Analogies from the past wouldn't have a one-to-one relationship to the realities of this very different time.

When Kariander Dok, Tonol Kokat, and Heinrich von Undine contacted us, they weren't in the same place they'd been before. There was a stone wall behind them. The lighting was bad, and the audio echoed as though they were in a very large, acoustically hard room.

"Well, Alichin, have you decided to relinquish your people and facilities?" Dok asked at once.

I took over. "Since you've precipitated an internal confict, Dok, this is out of Ali's hands. As the senior Commonwealth military officer here, I'm in charge."

"Another Colonel Chase, eh?"

"Induno Boldwon is no Colonel Chase," Ali snapped.

"It makes no difference. Boldwon, what is your answer?"

"No surrender, Dok," I said vehemently.

"Then we must use other methods," von Undine put in. "We hold a number of people of importance whose welfare is of concern to others, including yourself. Do you know where we're transmitting from?"

"Not yet."

"It will become obvious, because this is where we're holding our prisoners."

"Hostages, you mean!" Alichin snapped before I could stop him.

"Call them what you will," von Undine said with a smirk. "But we have something to negotiate with. In exchange for your surrender, Alichin, no further harm will come to our prisoners."

I replied, "You make threats and allegations. Who have you got and where are they?"

Kariander Dok replied. "We're prepared to show you what we have to negotiate with."

The video pickup panned to the left.

As if on cue, someone screamed.

It was a scream of pain and terror.

What we saw on the screen was something ten centuries out of the past.

Ali gave vent to an incoherent curse of rage.

Until that moment, I didn't know of the existence in the Commonwealth of dungeons and torture chambers.

"As you can see for yourselves," Kariander Dok's voice said over the muffled moans and painful screams of that grisly scene, "they are still alive."

The purpose of this type of terrorism has always been brutal and subtle: to coerce by threatening friends and loved ones. It was worse than barbaric; it was inhuman. This was the middle of the 21st century, and people shouldn't be doing this sort of thing! But there it was on the screen. As the camera panned from person to person, I almost got sick to my stomach.

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I forced myself not to look at what they were doing to Vaivan.

Ali was almost incoherent. "I'll wash my iklawa in your blood! I will slit your dead body open for the jackals to feast upon! I would not poison myself by eating you!" The old curses tumbled out of him.

"I believe we have something to negotiate with," Dok said smoothly.

I took a very hard line. "Dok, you can't keep them in that condition very long. If they die, you'll have nothing to negotiate with. All I have to do is delay. If I broadcast the tape of this to the world, Dok, you'll lose any popular support you may have."

"There have been things of this sort in other places; no one bothered to react. The world is full of pain and death. This is nothing new. Commonwealth law itself requires violent punishment."

"Law shows justice and mercy."

"You're prolonging the agony of these people," von Undine's voice broke in. "Surrender your space forces."

"Not without negotiation," I told him. I wanted to draw them out of Topawa into a meeting on neutral ground. "I want assurances you'll release these people if I surrender and assurances I won't end up in your dungeon, too. But I'll talk only if you start treating your prisoners humanely. Otherwise, I won't be able to control what the Commonwealth people will do to you."

"You're in no position to threaten," Dok's voice replied. The video panned back onto the triumvirate, ending the horror show.

"Neither are you. By rights, I shouldn't agree to negotiate, but I'll compromise if you will." I hated to play with words when my friends were hurting. If this was war, it wasn't the sort this warrior liked to fight. I *had* to submerge emotions and feelings; there was no other choice except to give in to these bastards. And I wasn't about to do that.

"It will have to be done through intermediaries," Dok said. "We cannot leave now."

He was right. None of them could leave Topawa while they were directing operations of their coup. Their situation wouldn't improve, because their treatment of prisoners would motivate the impys to fight without quarter.

"I'll talk with an intermediary, but only on neutral ground."

"Zurich?" The city was one of the bastions of world power groups where interesting banking rules made it possible to stash the loot.

"I want truly neutral ground, Dok." I was relying on the fact that people still thought of space in terms of distances rather than energies. "I'll meet you halfway: GEO Base One." It was the old powersat construction base that hadn't been used for twenty years. Parked at GEO Spot One-Eighty over mid-Pacific, it had been visited by a RIO spot inspection team about a year previously and the portlock module had pressure. "I'll meet your intermediary there in twenty-four hours, unarmed. There'll be two of us: myself with Omer Astrabadi as pilot. Who will you send?"

I'll call you in an hour."

"In the meantime, start treating your prisoners according the the Hague and Geneva conventions."

"We won't kill them."

That left a lot of leeway, but I knew he wouldn't kill them yet.

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Ali had calmed down a bit by the time I broke the circuit. He was still breathing hard. "Let me go with you," he pleaded.

"Not only no, but hell no! I couldn't keep you from trying to kill their intermediary."

"But I've got to do *something!*"

"You can find out where they're holding the prisoners."

"It's obvious," Ali said. "That dungeon is under the old fortress on the plaza of Topawa Centrum. The building's our national museum. We restored the dungeons to remind people of the horror of the past and warn them of what could happen with a breakdown of civilized behavior. They put it back into use."

The lasercom to Vershatets demanded our attention. It was The General.

"We saw," the old man said sadly. "It's worse than the atrocities of Colonel Chase, but we won't let this trio escape. The LandImpy and the CitImpy indunos are taking what action they can. Sendi, I can't provide effective leadership now. I'm much too disturbed by what's happened to my family. Will you take over, please?"

"Yes, I will, General." Suddenly with those four words, the whole future of the Commonwealth depended on me.

"Grandfather, I want to wash my iklawa in the blood of Kariander Dok," Ali broke in with a firm, resolute voice.

"No, Alichin. We will not revert to savagery to avenge savagery," The General told him. "Their case will be handled under the law."

"But our family's being harmed! Our family honor requires revenge!"

"Alichin, you're behaving like your ancestors. We no longer live in a world of want, and we must *never* go back to its principles, regardless of the behavior of others. And don't confuse the custom of going about armed with the principle of defending honor. A family doesn't demand honor or revenge; a family exists with and because of love and mercy. And our nation doesn't demand honor or revenge; it requires respect and therefore justice . . . and gives both."

"Grandfather, don't tell me that my strength is as the strength of ten because my heart is pure!"

"But it is. Call upon that strength. I've had to. How do you think I felt, watching more than fifty years of my life shattered by outlander barbarians with a credo of greed *which is no longer necessary?*"

When your friends and loved ones are being tortured, it's hard to be logical and rational. It took all of my professional training to put down the emotions that surged within me, a mere outlander who'd been a citizen of the Commonwealth for less than half a year.

But Ali couldn't control the emotions which made him ineffectual as a negotiator or military leader. The same was true of The General, but he knew it. In fact, LandImpy Induno Pahtu, CoastImpy Induno Shokutu, and CitImpy Induno Moti probably also had considerable emotional charge right then. I *had* to play the role of the cool, rational leader.

I wanted the *other side* to get emotional and to make mistakes because of biased or poor judgment.

It was now my show, and I couldn't

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blow it. Nor could I become another Colonel Chase. I had to be General Anegam Vamori standing before Oidak on that long-ago Christmas Day leading 20,000 untrained warriors bearing only assault rifles, grenades, mortars, assegai, and iklawas, facing a mercenary horde of 50,000 trained, experienced soldiers of fortune and professional looters armed with all the modern weapons. I wasn't just a mercenary hireling; I was now a warrior for the new prophet of plenty.

What a hell of a situation for a space jock to find himself in!

For the GEO Base One mission, I'd wear a full elastic pressure suit under my flight suit and a bubble helmet with an open microphone. If there was foul play or I bought the farm, the strategic plans would move ahead without me. But I'd be ready for foul play. I'd go unarmed as promised—that is to say, I wouldn't be carrying anything that was obviously a weapon. It didn't mean I'd be defenseless.

The message from the triumvirate came as hard copy. "They're doing a good job down there," Jeri reported, handing it to me. "The jamming from Vershatets is blocking almost everything. This came through on low-frequency narrow-band pulse code from Topawa."

"250450 1435Z> BALDWIN L5 FROM COMMONWEALTH PROVISIONAL GOVERNMENT TOPAWA> CONFIRMED MEETING GEO BASE ONE 1200Z 260450> AMBASSADOR PLENIPOTENTIARY PHILIP DUBOIS WOLF IS AUTHORIZED FULL POWER OF NEGOTIATION> ARRIVING YACHT PROXINOS GREEK REGISTRY BEACON CODE 6067> VON UNDINE FOREIGN MINISTER COMMONWEALTH PROVISIONAL GOVERNMENT TOPAWA> END MESSAGE END MESSAGE END MESSAGE> 250450 1437Z>"

"Who's this guy?" I asked Jeri.

"He's listed in bio data as vice president of the Bahrain Eurasian Investment Bank," Jeri said. "Guess you'll be rubbing shoulders with a micro-part of the Tripartite, sort of a Grand Exalted Big Dipper of the Persian Gulf Lodge."

"I won't even be meeting with someone from the Commonwealth, just an outlander! Okay, let's get this over with," I told Omer, and started toward the portlock hatch.

"Not yet, Yankee." The Mad Russian Space Jockey brought me up short. "You still look like typical space jockey."

"So?"

"You are now Induno Sendi Boldwon, Marshall of All Commonwealth Impys. So you must look like it."

"Why bother?"

"Is old Kazakh saying: A circus must have elephants."

"Okay, I get it. Is old Yankee saying: Don't do a vast thing in a half-vast way."

"So you get these. Stand still." Omer pinned the three golden triangles of an induno on my collar tabs and added the crossed iklawa-and-assegai impy badge on my left breast pocket. Then he embraced me Kazahk-style.

"By rights, Tsaya or Vaivan ought to do that. Why couldn't you have been born a beautiful woman?" I asked him.

We had no trouble with STC. We filed for a full diplomatic priority clearance and got it, along with the best serv-

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ice we ever had. STC even kept us informed of the progress of the *Proxinos,* as the Greek-registry yacht bearing Philip DuBois Wolf also closed on GEO Base One. It was as though STC had choreographed a ballet for two ships approaching an abandoned space facility in unison.

They opened communication with us first. "*Tomahok,* this is *Proxinos.* Do not—repeat, do not—dock with GEO Base One. Station-keep one hundred meters outside the station orbit. We will be one hundred meters inside the orbit. Send your representative to the Base on a scoot or by eeveeay. Acknowledge."

"*Proxinos,* this is *Tomahok.* This is hardly diplomatic protocol," I objected.

"This meeting relates to an internal Commonwealth matter and has no diplomatic status."

"But I'm meeting with a representative who's not a citizen of the Commonwealth," I told them.

"I take it I'm talking to Captain Baldwin? This is Philip DuBois Wolf, and I'm a citizen by proclamation of the Provisional Government. If you want the parley you demanded, get over to the portlock." Philip Dubois Wolf had an accent that said he'd grown up in the prep schools of the American Northeast. It was far from the Good Old Boy Down Home Folksy Drawl of an aerospace pilot and certainly different from the inflected Commonwealth English my ears had grown accustomed to.

I told Omer, "Hide in the base structure with the sky junk in case someone decides to take a shot at you. You're my ticket home, Russkie."

"You are a distrustful, sneaky person, Yankee. So are they. Keep your mike open," he reminded me needlessly. "If you get into trouble, I will ram the *Proxinos.*" I knew the Mad Russian Space Jockey would.

Omer had stopped a hundred meters from the end of the hexagonal inspection module. I didn't need a line for that short distance, so I pushed off. There was plenty of Base structure around to grab if my push was misdirected, but I didn't need it. Less than a minute later my boot soles smacked the old metallic plates of the hex module.

Wolf came over on a scoot.

Once inside and sealed, I discovered enough residual pressure on the Base side of the lock to repressurize and let us use the module for a helmets-off conference. The fifty-year-old photovoltaic cells on the module's solar panel had enough poop left to provide lighting and fans. I opened my face plate but didn't turn off my transmitter. Wolf did and didn't comment that I hadn't. I knew then he wasn't a spaceman. We were surrounded by metal walls that had plastic-filled slots in every external wall. These acted as slot antennas to retransmit r-f signals in and out, eliminating the need for an external antenna on every module. Omer in the *Tomahok* could pick up my suit radio easily and relay it to L-5 and Vershatets.

When Wolf removed his helmet and strapped it around a nearby conduit to keep it from floating away, I saw a man who had the bland, forgettable features of a bank clerk or telenews actor. To this day, I don't remember what Philip DuBois Wolf looked like. I suspected he'd cultivated his un-noteworthy appearance because, as a minor member of the Tripartite, it was to his advantage

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to be obscure and forgettable. He was one of the faceless people who ran the world.

Wolf didn't bother to be civil and introduce himself. He merely opened a sealed cannister and extracted some hard copies. "Captain Baldwin," he began, "do you have the authority to surrender the Commonwealth space facilities and personnel to the Provisional Government?"

"Would I be here if I didn't"

"A procedural question. Are you prepared to surrender them?"

"I'm prepared to discuss it."

"There's nothing to discuss, only the formalities to complete."

"That's not why I'm here," I reminded him. "There's a question of assurances concerning the treatment and release of people being held hostage in Topawa."

"Oh, yes, the enemies of the Provisional Government seized at Karederu," Wolf muttered absently. "There can be no question of their release. They'd jeopardize the security of the new regime."

"I was assured that the hostages would be released unharmed and remain unharmed."

"Replay the tape. No such assurances were given." Wolf called my bluff.

"Then there's nothing further to discuss, and you can return to report the failure of your mission."

"Then we both will have failed, because the Provisional Government will still hold the prisoners. And the price may go up."

"I don't believe there's a question of price, Wolf, unless you admit to bargaining for power with human lives."

"This is getting us nowhere. I can assure you of the identity and condition of the prisoners and of their proposed disposition under the new regime. In exchange for the solemn promises and high agreements of the Provisional Government, you are to surrender all of the space stations, space factories, space vehicles, and powersats controlled and operated by corporations and other business entities chartered by the former Commonwealth government, and all personnel involved therewith." It sounded as if he was reading it from the hard copy.

"And I came to find out if there was any basis for trust in your principals. At the moment, I have none, and you haven't created any. Furthermore, I'd expected to meet with a high-level official, not a lackey called in and given rump authority so Dok and his cohorts wouldn't be exposed to risk."

"You've received my bona fides. I hardly think your insulting attitude is justified." Wolf was a rude snob. I knew his type. Raised by nannies, sent off to prep schools, graduated from ivy-covered universities with degrees in literature or communications, and working with investment or publishing firms even though the trust fund meant they didn't need to work at all—these were the storm troopers of the power groups, I understood now.

"The Tripartite needs the Commonwealth's space wealth and I believe they'll do anything to get it. So how do I know I won't be signing death warrants not only for myself, but also for the hostages?" I asked.

"Sir, you have my word!" Wolf exclaimed.

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I snorted a rude expletive. "Every time I've had to deal with a banker like you, it's never been a matter of a man's word, only the hard realities of legal tender and collateral. As far as I'm concerned, I'm returning the favor. *Trust you?* Hell no! You represent Dok, von Undine, and Kokat, who've proved they can't be trusted. We'll deal either in the hard realities of agreements with teeth in them or in the equally hard realities of war. Take your choice."

Wolf shrugged noncomittally. "Surrender, or your people die."

"What are your terms?"

"Total surrender of all Commonwealth people and property off-planet. You will be treated well."

"Not good enough."

"What more do you want?"

"A written guarantee published worldwide giving assurances that your provisional government and any other government that may grow out of it, if you should win, will observe the strictest adherence to the 1949 Geneva Conventions and the 2001 Manila Agreements relating to the treatment of the wounded and sick, the protection of civilians, and the treatment of prisoners of war. Furthermore, the Helsinki and Bombay human and civil rights standards and provisions must be strictly observed and applied to *all* Commonwealth citizens, past, present and future."

"This is an internal matter. International agreements don't apply."

"They must, or I won't surrender anything."

Wolf looked down at the hard copy. "This agreement spells out in detail every concession my government is ready to make. I suggest you read it, because it represents our position in the matter." He started to hand it to me.

I had just taken it between the fingers of my elastic pressure glove when there came a shuddering jolt and the module started to come apart. When a module five meters across and thirty meters long with a half-atmosphere internal pressure splits, it goes fast. When I saw the seam behind Wolf open, I immediately closed my face plate and concentrated on turning on my backpack.

When I looked about two seconds later, Wolf was gone. He'd been blown through the opened seam, but his pressure helmet was still strapped to the conduit.

Suddenly, I was in vacuum with nothing around me. The module had scattered itself in pieces. Pieces of space ship were tumbling outward from where the *Proxinos* had been parked.

"Sandy! You there?" my earphone rasped.

"Omer, you all right? Is the *Tomahok* hit?"

"Everything copasetic! The mass of GEO Base One was between me and the explosion. Keep talking. I home on you."

"What blew?"

"Somebody hit *Proxinos* with a hell beam. Explosion blew the module apart, too. Keep talking. I got hands full sneaking through GEO Base structure to get you. I don't want to be target for hell beamer. You get aboard, then we talk."

I saw him coming through the clutter of old GEO Base One modules. A few minutes later I was back in the *Tomahok*. I still had Wolf's agreement clutched

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in my hand. I put it away. I never got around to reading it.

Leaving my faceplate closed, I slid into the co-pilot's seat, strapped in, and connected my hoses to the ship supply. "I owe you another one, Russkie."

"*Da*, but what now, Yankee?"

"I don't know who shot at us or why, but it'll be probably be explained away as a 'regrettable accident.' "

"*Tomahok*, Vershatets Command relaying through L-5," my earphones came alive with a new voice.

"Roger, Vershatets, *Tomahok* reads you loud and clear."

"Sendi, this is Kivalina. Jeri monitored that hell beam shot and reports it came from a Janzus facility in inclined geosynch. No single member of that four-nation treaty group will ever accept responsibility for the shot, because control is spread too thinly between them." Which meant that hell beamer was controlled by Tripartite interests. They'd wanted to hit the *Tomahok*, but it had been too hard to spot. They'd shot at the obvious open target and gotten the *Proxinos* by mistake. Or they'd deliberately wasted the *Proxinos* in order to get the *Tomahok* which they couldn't see.

I took a deep breath and said, "Okay, we're going to sit tight and hide here until we can get a skalavan escort."

"*Tomahok*, this is the Free Trader *Star Viking*, Captain Kevin Graham commanding," another voice cut in. "We've been monitoring your meeting with Wolf. Don't waste time calling in your warships. An escort of ten free traders is converging on GEO Base One. We'll see to it you get back to L-5. It's impossible to hide an attack on a large convoy. Somebody would have to do a lot of explaining when the damage suits came before various courts, to say nothing of the insurance adjusters . . ."

I replied, "Hey, Kevin! Forgot about you!"

"A lot of people have, and we're damned sick of it. There hasn't been much the League of Free Traders could do until now. But they've taken Vamori Free Space Port out of action and otherwise started to raise hell out here. It's damned-near ruined some League members. So we're taking sides. *This has got to stop, and we're going to help you stop it!*"

"042950 0800Z> FOR GENERAL RELEASE FROM UNITED MITANNI COMMONWEALTH SPACIMPY COMMAND L-5> COMMONWEALTH SPACE VESSELS IN COMPANY WITH LEAGUE OF FREE TRADERS VESSELS WILL MANEUVER IN ORBITAL SPACE COMMENCING IMMEDIATELY TO ASSIST COMMONWEALTH MILITARY FORCES WITH INTERNAL REBELLION> MOVEMENTS AND ACTIONS OF COMMONWEALTH AND ALLIED VESSELS ARE NOT INTENDED TO THREATEN NONCOMMONWEALTH PROPERTY OR PEOPLE IN SPACE OR ON EARTH> RESPONSIBILITY FOR COST OF DAMAGES INADVERTENTLY CAUSED BY THESE NONHOSTILE ACTIVITIES WILL BE ASSUMED BY COMMONWEALTH GOVERNMENT UPON PRESENTATION THROUGH NORMAL DIPLOMATIC CHANNELS OF DUE PROOF OF CAUSE WHICH IS SUSTAINED BY ARBITRATION UNDER PROVISIONS OF 2026 TREATY OF LUXEMBOURG> COMMONWEALTH GOVERNMENT RESPECTFULLY REQUESTS THAT THE ACTIONS AND MOVEMENTS OF ITS VESSELS AND THOSE OF ITS ALLIES BE VIEWED WITHOUT PREJUDICE OR FEAR>

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COMMONWEALTH GOVERNMENT FURTHER STATES THAT ANY REPEAT ANY HOSTILE ACTION TAKEN BY ANY REPEAT ANY PERSON FACILITY VESSEL OR NATION AGAINST ITS VESSELS AND PERSONNEL IN SPACE OR ON EARTH WILL BE MET WITH IMMEDIATE RETALIATION> GOVERNMENT OF THE COMMONWEALTH HAS NO INTENT OF HARMING OTHERS IN PURSUIT OF ITS OWN INTERNAL DEFENSE AND SELF DETERMINATION> SPACIMPY INDUNO SENDI BOLDWON COMMANDING BY ORDER OF THE EXECUTIVE DEFENSE COUNCIL OF THE GOVERNMENT OF THE UNITED MITANNI COMMONWEALTH> END MESSAGE END MESSAGE END MESSAGE> 042950 0805Z>"

I sent Kariander Dok my version of Grant's message: "In view of your attack at GEO Base One, no terms except an unconditional and immediate surrender from you can be acceptable now. I propose to move immediately upon your forces."

I never got an answer, but it didn't make any difference anyway.

"Onward to Richmond!" became "Onward to Topawa!"

Battle cries, shibboleths, and heroic statements serve a definite purpose in winning a war and are even more important when citizen warriors from a *levee en masse* fight side by side with professionals.

The battles of Second Oidak, Pitoika Gate, and Topawa are seldom described in detail in history books, because of the revulsion most people feel for the violent human activity called war. But they're still studied at West Point, the U.S. Naval Academy, Sandhurst, St. Cyr, and the U.S. Aerospace Force Academy.

The Second Battle of Oidak pitted LandImpy and CitImpy against the so-called Freedom Army. The CitImpy overwhelmed the enemy by sheer ferocity and the LandImpy reduced strong points with dogged professionalism. Then the Commonwealth forces split.

Induno Kivalina Moti commanded the Northern Impy composed of CitImpy troops with LandImpy regiments in reserve. They quickly regrouped after Oidak and surged along the power transmission lines toward Vamori Free Space Port.

The Southern Impy was composed of LandImpy reinforced with CitImpy. Induno Pahtu led her troops in the field, seizing the advantage gained at Oidak to ram columns along opposite banks of the Topawa River toward the capital, maintaining contact with the routed Freedom Army.

CoastImpy Flotilla Eight under Induno Shokutu fought a naval battle as classic as Salamis. Shokutu's small, fast hydrodynes mined Pitoika Gate under the Sunrise Bridge, then withdrew. When the Freedom Army's reinforcement convoy approached, Shokutu's hydrodyne force trapped them between the mined harbor mouth and the open sea, outmaneuvered the convoy screen, brought the convoy under attack, and sent all but three ships either to the bottom or aground on the Sun Coast south of Pitoika, where the CitImpy slaughtered the shipwrecked mercenaries who came ashore.

I shouldn't have doubted the fighting capabilities of Commonwealth people, professional or amateur. The coup's biggest mistake was failure to gain control of communications and movement.

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Without these, they couldn't prevent the buildup or coordination of the impys.

The failure to control communications also meant that the pictures of the Karederu hostages were seen everywhere. It doesn't help a military leader to be emotional, but emotion can motivate warriors.

Abundancy economics *had* been successfully communicated to three generations of people who were also kept reminded about the brutal life of prior times. None had any desire to sample it. Every citizen knew he'd been armed and trained because only he could prevent it from returning some day.

Man and woman, they fought. They fought with a fury, gallantry, and *elan* comparable to when the Mahdi's *Jehad* forces overwhelmed Gordon's garrison in Khartoum or Cetewayo's kwaZulu forces broke the British square at Isandhlwana. Or when the Suomis stood firm, then pushed the Russian Bear back into its own territory. They reminded me of the United States Marines at Guadalcanal or Wolmi, and the 101st Airborne at Bastogne.

The Commonwealth malcontents and outlander mercenaries of the Freedom Army were worthy adversaries, but couldn't match people who even in peacetime carried iklawas at their waists.

As CIC and SpacImpy commander, my mission was the recapture of Vamori-Free, to be followed by the Topawa assault. I planned to move fast and alter plans in the face of new situations. That's the classic formula for winning a battle or a war. Like General Nathan Bedford Forrest, I wanted to git thar fustest with the mostest men.

Holding and defending a space port had never been done before, and the Freedom Army didn't know how anyone could attack and invade a space port from space.

I did.

A space port is mostly space. Vamori Free Space Port covered more than 7,500 square kilometers and stretched more than 150 kilometers along the seacoast. We mounted a two-pronged effort against the Vamori-Topawa objectives. Pahtu's river offensive would pin down Freedom Army forces at Topawa. Moti's Northern Impy would hit the western edge of Vamori-Free by following the power transmission lines from Oidak. Then my space contingent would strike Vamori-Free and land.

It sounds easier than it was.

I first had to sanitize the threat of a couple hundred SAMs at Vamori-Free, then force the Freedom Army to keep their heads down. Omer would command our eight skalavans on low-level passes at high mach numbers too fast for SAM reaction. The ear-busting shock waves would spread confusion. Omer's skalavan sweeps would be followed immediately by tacair strikes to reduce the SAM threat. The tacair strikes were to be followed by a second pass of Omer's skalavans to cover the landing of Ursila's packets and free trader ships manned by as many SWAT teams as we could put together from CitImpy people in space. Some had to be flown by a single pilot, because we were short of pilots. There was no ground power for landing aids at Vamori-Free, and shipborne radars don't have the precision necessary for landing, so Omer had the crucial task of dropping a landing bea-

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con on his second pass. When the landing assault force hit dirt, most of the enemy SAMs should have been out of action and most enemy troops in confusion or pinned down by Moti's land attack on Vamori-Free's western edge. We'd then operate from behind. Once the Vamori Free Space Port was consolidated, our combined forces would turn southwesterly and pincer the final objective, Topawa. A rescue mission involving vertical envelopment of Topawa Centrum was my responsibility after the landing.

With Ali's family in danger, it would have been wrong to keep him at L-5 in spite of his emotional condition. I didn't want him in command capacity, but we were short of pilots, so Ali flew the *Tomi*.

It looked good in the computer. But Murphy's Law always has the last word. People suffer from failure of judgment, fail to seize opportunities, or fail to be where they're supposed to be when they're supposed to be there. That makes ball games and battles.

Everything went beautifully from L-5 down. STC was cooperative and got other ships out of our way. Or perhaps other ships, fearful we'd strike anyone who got in our way, deliberately saved STC the trouble by scheduling around our operation. No one wanted to start a war.

RIO Commandant Peter Rutledge gave me a call as we left lunar orbit: "I say, Sandy, I do hope you won't spot the carpet, old chap. If this internal affair among you Commonwealth types were to blossom into something else, RIO would do its level best to keep it confined to the ground. If the balloon were to go up, I rather suspect from talking with the military commanders above LEO that most of them would become rather devout cowards, although none of them would ever admit it. Space is already far too dangerous without having others shooting at one's pressure hull. So we'll bloody well manage to keep anyone from shooting at anyone else. But be a sport, Sendi: don't ask how. You know full well what's out here."

Was I glad to hear that! Maybe we wouldn't have Space War Two after all. "Thank you, Commander Rutledge of the Space Patrol."

Although operating under STC clearance compromised secrecy and surprise, we gained the respect of others because, even in the midst of our great internal upheaval, we played by the rules. There may have been some tense fingers poised over buttons, but nobody shot at us. Anybody who wanted to know where we were at any given instant could find out. And we damaged nothing.

Once Omer got his skalavans in the atmosphere, he let it all hang out. I wished I'd been with him, but hard as it was to accept, at physical age 28 I was already an over-the-hill space jock when it came to one-man hot vehicles like skalavans, Space Hawks, or Black Tigers. I could hear Omer: "Hokay, Blue Boomers commence east pass. Down to angels one. Mach fifteen! . . . Hokay, Blue Boomers, commence nine gee loop now. Red Boomers, commence south pass, angels one. Hokay, Yellow Boomers, start your run now!"

The passes of ten-ton skalavans at Mach 15 at a kilometer altitude caused

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considerable damage from shock wave overpressures alone. The hypersonic carpets laid across Vamori-Free not only caused the sort of confusion we'd hoped for, but also damaged fragile structures. It was a good thing glass is a primary Commonwealth product, because there wasn't a window left in any building there.

Low-level tacair aerodyne gun ships were standing by. "Stomper Leader, this is Boomer Leader," Omer's voice continued. "You are clear to clobber. Quick look shows joy near Areas One-zero, One-seven, Three-two and Niner-zero. You have five minutes before we start our second pass."

"Boomer Leader, Stomper Leader, tally ho! We are engaging. Blue Stomper to Ten, Red Stomper to Seventeen, Yellow Stomper to Thirty-two, and Green Stomper to Ninety. Purple Stomper, join Yellow Stomper at Thirty-two for SAM suppression."

Our ships went into blackout. When we came out, we were over Vamori-Free's western horizon, but I couldn't pick up Omer's implanted landing beacon. "Slugger Leader, this is Bold One. Do you receive signals from Prong Alpha?"

Ursila's voice came back, "Slugger Leader. Negative on Prong Alpha. Something's wrong, Sendi!"

"Boomer Leader, this Bold One out of blackout with Slugger. We are negative on Prong Alpha. Repeat, negative on Prong Alpha."

"Bold One, this is Stomper Leader. Purple Stomper was too high, and Boomer Leader made his second pass low to deploy Prong Alpha. They had a mid-air."

Ohmygawd! Omer! Omer! At a closure rate of Mach fifteen, neither had seen each other. The aerodyne may have been on Omer's screen, but he probably didn't have time to look at it. The Mad Russian Space Jockey had let it all hang out, and some damned fool was where he shouldn't have been and cut it off. It was my fault for mixing Mach zero aerodynes with Mach fifteen space ships! There was no time to grieve. We were less than five minutes from landing with no beacon to steer us in. If I didn't do something, there would be a lot of pranged space ships.

"Slugger Leader, this is Bold One. Did you monitor that?"

"Affirmative! Sendi, I'll get down using calibrated eyeballs, but some of my pilots can't," Ursila reported. "Get a beacon down there, *any* beacon!"

"Stomper Leader, this is Bold One. Squat your aerodyne in Area Twenty-four squawking four-zeroes." I ordered.

"I'll draw fire if I do!"

"If you don't, we'll overfly and leave you up the crick. Take your choice. We need your beacon in four minutes."

"I can't risk my . . ."

"Stomper Leader, this is CitImpy Prime One," Kivalina cut in. "Comply with Bold One's order. Everyone's risking everything here. *Topawa or the Dilkons!*" That was The General's last call to his warriors before the First Battle of Oidak.

The reaction was immediate: "Topawa or the Dilkons! Stomper Leader is squatting in Area Twenty-four. Please don't land on me!"

"We won't. And thank you," I told him. "Sluggers all from Bold One, crit-

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ical instructions. Tape for replay. No time to repeat. Landing beacon is squawking four zeroes at Area Two-four. Have your computer offset for your specific landing coordinates. Execute . . . or you'll have a damned rough landing unless you put it in the ocean which isn't much softer. Break, break! Moti, what's the ground situation? Are they going to shoot at us?"

"Bold One, recon reports almost all enemy troops at Vamori-Free are involved with my units. Hey, Sendi, don't get your legs shot up, okay?"

"Give me covering fire this time, Kivalina."

With a momentary surge of grief, I recalled what Omer had taught me about working without the assistance of modern technology. I had two eyes and a functioning brain behind them. The *Tomahok* was a machine, a tool, and it was up to me to make it do what I wanted it to do.

I had a load of young Commonwealth space facility technicians and mechanics who'd gone through CitImpy training. I told them to strap down, secure weapons, and stand by to land. *Tomahok* swung around the alignment circle and the Area 73 runway was ahead. At 350 kilometers per hour, there isn't much time for making and correcting mistakes. I had it knocked until a small SAM zipped past my nose and missed because I'd just deployed the canards which decelerated *Tomahok* with their drag. Then tracers laced the sky in front of me.

I got on the runway and the hook caught the third decelerator cable. The two-gee stop was designed for cargo payloads. My harness held because it was designed to. But three of my seven swats were injured. It took all five of us to get the unconscious young men out of the ship and into the ops shack. I left it to two Vamori-Free technicians there to patch up the busted legs and broken arms.

I went back aboard to get my AR-3 rifle and bandolier of clips, grenades, plastic explosive wads, and initiators. As I left the cabin, I looked for my swats, but they were nowhere to be seen or found; they'd melted into the landscape to harass the enemy's rear as instructed. But there was no action around Area 73.

Ursila and Ali were supposed to land in Areas 72 and 74. But no ships were in either area or in the sky. Everyone was down somewhere on Vamori-Free . . . I hoped.

I had to move without them. Getting to Topawa for the rescue was far more important than searching for my support. If everybody involved in the rescue mission followed instructions, they'd grab the nearest aerodyne or other transport to Topawa and get there as fast as possible. I had to hope Ali was in condition to do so, but I couldn't worry about him any more than I could afford then to grieve over Omer.

A ComSpat aerodyne was parked near the ops shack. I got in, kept the window open with the black snout of my AR-3 sticking out, and punched the universal emergency start code: 11-20-01. I went up to ten meters in hover, then headed southwest at full slot. I managed to see power lines and towers in time to go under or around them. There were a lot of aerodynes in the air, but none of them came close enough to

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shoot or be shot at. It looked like a hell of a fight going on to the west; there was a lot of dust and smoke.

When I zipped over a railway line, I was suddenly over open country on a beautiful "blue" day with the railway line running straight toward the far white buildings of Topawa. I stayed at ten meters; I didn't want to hit a train.

As I grew closer to Topawa, I discovered I'd goofed by not being briefed on Topawa's layout and where the national museum was. Ali had said it was in the Centrum where the old colonial buildings still stood, some in use by the unusually small Commonwealth government, others left as exhibits and museums. I remembered from my first auto trip from the railway station to Karederu that there was a central plaza where the public gallows were located. That had to be the Centrum.

Topawa seemed deserted. I roared down Chiawuli Street and found the Centrum at the end of it.

There wasn't a soul in sight. *They've moved the prisoners!* I told myself. But I had to look. So I cushioned the aerodyne in the Centrum plaza and got out, AR-3 at the ready.

Which building was the national museum? I had to go to each in turn to read the sign or look at what was cut into the sandstone above the entrance. The fourth one I came to was the National Museum.

The front doors were open. I dropped to my belly and peered around the bottom corner of the huge entrance. Two armed men in grey uniforms were talking about twenty meters down the hallway. One wore a crew-cut under his grey beret, but the other wore a kaftan. I caught part of the conversation:

"How long are we stuck here, Fritz?"

"They'll bring 'em out now, Ben. The aerodyne just arrived for the meat."

I stuck the barrel of the AR-3 around the corner and squeezed off two shots. Both soldiers were thrown about four meters down the hall by the impacts. Almost before they hit the floor, I was on my feet and moving.

The sign was still there:

Entrance

OLD COLONIAL SECURITY POLICE INTERROGATION CHAMBERS AND DUNGEONS

CHILDREN MUST BE ACCOMPANIED BY ADULTS

Someone was in the spiral stone staircase that led down into the bowels of the building. He was wearing the grey uniform of Kariander Dok's Freedom Army, so I shot him and followed his body down. Then someone else yelled in Arabic and shot from below. The bullet hit the stone walls and exploded, sending shards of chips into the stairway. I pulled the pin on a grenade and dropped it. Most of the shock wave was attenuated by the spiralling walls, and after it slapped over me I started down again.

Apparently, there'd been only two sentries by the iron door at the bottom. I'd gotten them both. But the door was latched from the inside. I couldn't swing it open.

When I put my ear to the door's surface, I heard the sounds of a scuffle beyond. I couldn't tell what was going on.

The door hung to swing outward on massive iron hinges at the top and bot-

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tom. I molded plastic explosive around both hinges, set the initiators for ten seconds, and ran back up the spiral stairway. I hadn't used much explosive, but it was enough to blow the hinges off.

The doorway was filled with dust when I got to it. I stepped through, ready to shoot down whoever was beyond the pall.

I got one of the biggest surprises of my life.

Heinrich von Undine lay on the floor, his belly slit open from chest to crotch. Standing over him holding an iklawa dripping blood was Conobabi Chukut Nogal, the president of the United Mitanni Commonwealth.

There were other bloody forms lying on the floor. I recognized one of them as Wahak Teaq, who had apparently died with iklawa in hand.

An unbelievable sight was Vaivan Teaq, clothes in tatters, the bruises of shackles on her wrists, neck, and ankles. She held Kariander Dok against the wall with one hand while she plunged an iklawa into his heart with the other.

Tsaya had been right. The word "iklawa" does resemble the sound the weapon makes when it's withdrawn from the body of an enemy.

"Nobody's hurt beyond repair or disfigured permanently," Tsaya explained. "With the expertise here in Vershatets and at L-5, we can rehabilitate everyone, even those who were given psychodrugs and allopeptides. And thanks to biocosmetics, there won't be any physical scars."

"But there are psychological scars, Tsaya," I added, "even among those who weren't in that torture chamber."

"Those scars may not be as deep as you believe, *moapa*."

"I still don't like what happened, Tsaya. I don't even like to think about the mercenaries I shot."

"Sendi, you're a professional military man. You should know that wars can't be fought without casualties."

I looked at my AR-3, which hung muzzle-down on the wall. "I thought I was a fighting man, but fighting in the air and space is sanitary. It's something else to fire that and watch a man get thrown four meters through the air by the impact of a bullet that also tears his guts out. I never before saw what happens to a man when he dies. Death turns out to be grisly . . . and real." I snorted with distaste and looked away from the weapon. "I never want to touch that thing again."

"Sendi, you may have to and you will, when the time comes." Tsaya sat in my lap and tried to comfort me. "Until everyone understands The General's abundancy economics, we'll have to fight to protect ourselves from those who try to take things away and make us slaves. It'll take time to conquer greed and power lust."

"That can't happen too soon for me." I shook my head. "But why does it have to cost so much to get people to see the obvious?"

"People have never seen it before, Sendi."

"The costs are enormous! Omer alone makes it too costly for my likes. but there was also Wahak . . ."

"You must go to Vaivan, *moapa*," Tsaya told me.

"Dearest, you know the risks a man takes consoling a widow."

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"But we've both taken risks. You took a risk tackling me at Karederu that far-ago night. And we both took risks in marriage yesterday."

Why had I wed this cool, professional witch doctor? Do I have to have a reason? No one else does! It was far more than the heightened sexual drive that results from being shot at. I didn't have to get married to bed Tsaya.

Some psychotechnicians claim a man marries a woman who reminds him of his mother. There may be something to that. Tsaya did, with one exception: she showed her love. I hadn't been celibate during my years in the Aerospace Force, where succulent young people were always eager for those who'd assumed the heroic mantles of the sailors, railway men, aviators, and astronauts who'd preceded them. But I'd never *loved* a woman before or had her love me. It's a fortunate man who marries his first love.

But the marriage ceremony had disappointed me, because I'm a romantic. A Commonwealth wedding bore the greatest resemblance to the Muslim practice.

I never informed my parents in Santa Barbara, because they existed only as a dim memory. I was now a different person with a different name and a different way of life half a world away.

I was happy except for one nagging thing that nibbled at me and wouldn't turn loose: Vaivan.

"Sendi, I know you better than you think. You must go to Vaivan. *Please* do so, *moapa*!" Tsaya insisted.

Tsaya's a strong-willed person, and I couldn't reason with her. Actually, my excuses weren't based on reason at all. The images of that video transmission wouldn't vanish from my memory.

I decided to treat it like the duty of visiting recently widowed wives of pilot comrades.

To my relief, I found General Vamori sitting with Vaivan on a porch of the R&R center overlooking the Vicrik valley and the white Mount Doradun and the Dilkons. Synflesh covered most of her reconstruction, but the mere presence of those dressings reminded me of her ordeal.

"Sit down, sit down," The General offered, swinging a chair around. "A spaceman should never have to stand on Earth."

"Yes, please sit down, Sendi," Vaivan repeated, her voice and words thick because of the reconstructive surgery on her face and the lingering effects of psychodrugs. "I'm very glad to see you again."

I took the chair. "So am I. There were times when I wondered if we ever would, Vaivan."

"It's over," she said.

"Not really. Just part of it."

"Don't you foresee an end to it, Sendi?" The General asked.

"I don't know. It's too soon for me to straighten out my thinking," I admited. "The Tripartite still exists. We didn't hurt them much."

"But we survived the very worst they could do to us, Sendi," Vaivan pointed out quietly. "They can't ignore us. We won't go away. And they can't destroy us. We have too many friends now."

"And you changed the game, Sendi," The General added.

"Me?"

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The General nodded. "It's no longer the same system. RIO is now a non-national space patrol. You helped the transition happen with your willingness to throw away provincial loyalties in favor of broader ones—an *extremely* difficult thing to do, because one loses old friends and can only hope to keep the new ones."

I had to nod in agreement, too, but I did so sadly. "But because of what I did I can never go home again."

"It was never 'home' in the first place," The General observed.

"Sendi, the Santa Fe agreement collapsed yesterday," Vaivan said.

"I didn't know that. I've been . . . uh . . . busy."

Vaivan smiled knowingly. "Yes. The League of Free Traders refused to operate to space ports that imposed the Santa Fe Tariffs. League captains simply diverted to Vamori-Free. The League action didn't last eighteen hours. It disrupted commerce so badly that the various governments involved had to give in. You were the one who called the Tripartite's bluff in GEO Base One, Sendi."

"I don't care for the credit line," I said after a moment, "because tomorrow the world will ask me what I've done for it lately. If it's a new game, we'd better figure out the rules."

"This time," The General promised, "we'll help make the rules."

"Maybe." And maybe the last few weeks had made me cynical, or perhaps I was suffering from too much tension, not enough sleep, meals on the run, and trying to juggle seventeen balls in the air at once.

It was time to do my duty while The General was still present. "I . . . I'm sorry about Wahak," I tried to express my sympathy, but it came out in trite and halting words.

She smiled in spite of the fact that it probably hurt her to do so. "We all are. But Wahak died fighting. He didn't stand there and wait to be killed. Do you know what happened in the museum, Sendi?"

"I haven't really wanted to talk about it."

"I *want* to talk about it, because I'm *proud* of what happened! When we heard you shoot in the stairs, Kariander Dok gave the order to use us as human shields for the triumvirate's escape. Kokat was scared and got reckless when he unchained Wahak. My husband killed him and released Chervit, who released me."

"Look, it's difficult to talk . . ." I began. I was the one who was finding it difficult.

"Difficult?" Vaivan said with her eyes suddenly sparkling. "You had the difficult job, Sendi. You didn't know what was happening, but you tried to save us anyway. You did. You made Dok panic. That made it possible for us to free ourselves and fight."

I couldn't imagine it. "Vaivan, you'd been physically and mentally tortured for over a week. How'd you have the strength to do *anything?*"

"What's preferable? To wait to be killed as cattle strung up for slaughter in an abattoir? Or to fight and die like human beings?"

"If one acts like a slave, one will be treated like a slave," The General said.

"It was a fair fight." Vaivan slowly worked the fingers of her hands under

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their synflesh to exercise the healing tendons.

"Fair?" I wasn't sure what her concept of "fair" was.

"Dok and I were both armed. It began equally and ended humanely," Vaivan said. "If Dok had survived, the Board of Jurisprudence might have sentenced him to dismemberment and beheading."

"I thought the only capital punishment here was hanging."

The General said, "Based on the nature of the crime, the Board of Jurisprudence may sentence an outlander to be punished under Commonwealth law or the law of the offender's native land. It gives them latitude."

"As for Heinrich von Undine, Wahak was merciful, too," Vaivan went on, the brightness gone from her eyes and replaced with a rather grim look. "Von Undine was from the German enclave that remains at Dar-es-Salaam. The Board of Jurisprudence would've had the option of using his nation-of-origin's punishment for sexual offenses. In spite of all he did to me, that punishment is more than any man should face. I wanted to get him first, but President Nogal was closer."

The General stood up. Perhaps he wanted Vaivan and me to be alone. I wasn't sure that's what I wanted. His presence made this far more comfortable for me. "Please excuse me. There is work to do. We don't have to rebuild, but we do have to repair. Sendi, you're no longer my deputy. You have your own distinguished career and the family ties to cement it. SpacImpy Induna Chervit served to the end and died iklawa in hand. You're his logical successor, with a recent combat record to justify your permanent promotion and appointment. They'll be announced tomorrow."

I sighed. "General, I'm sick of fighting. I'm resigning for the second time in a year. I think I'd be a better historian."

"And I'm the archaeologist who was a better warrior," General Anegam Vamori said. "Sendi, don't resist the profession in which you're outstanding. I resisted once, when I became a leader rather than the scientist I wanted to be. I was an unhappy man. Then I discovered it was possible to be what I'm good at *and* what I wanted to be. Sendi, the ability to do *anything* well is a prize that many people long to possess."

He started to walk away, then turned to add, "Sendi, I won't always be here. However, now I know there are people like you to carry on. For that knowledge, an old man is very, very happy." He descended the steps from the porch and walked in a surprisingly spry manner down the graveled drive to disappear in to the conifers.

Neither Vaivan nor I said anything for minutes.

"I'm glad you came to see me, Sendi," Vaivan repeated.

"I wanted to make sure you were okay. Losing Wahak is a difficult thing. I know."

"How can you know, Sendi?"

I sighed and told her, "Because I've done this before when a fellow pilot bought it. Vaivan, these 'widow calls' don't get any easier. I've made too many and I don't want to make any more."

"This is different, Sendi. Wahak

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didn't die far away from everyone he loved and who loved him. He died with me, fighting for me and for everyone else there. It wasn't pleasant. But, oh, am I proud of that man!''

Wahak had been such a quiet, peaceful, almost pliant person. He'd also been a highly civilized man, because he controlled the basic savage that's in all of us. ''I underestimated him.''

''Many people did.''

''I also underestimated the Commonwealth and its people.''

''Others did that, too.'' Vaivan looked squarely at me and said, ''And I underestimated you, Sendi. Without your assault from space, this civil war could have dragged on in killing and misery for years.''

''I just led. I won't take credit for what other people did.''

''Oh, there were great acts of gallantry and courage in all the impys,'' Vaivan admitted. ''But you were the one who coordinated it all, and you were the one who worked out how to take Vamori Free Space Port. You made it appear that you could bring down infinite reserves and materiel from space. It was almost supernatural . . . magic . . . god-like.''

''Exodus 16,'' I told her.

''Yes, but you did it.''

''With the help of others, including your emotional twin brother . . . but he's exactly the sort of man we need on our frontier. There's a lot to be done out there, and he's the best man for it. He leads people well although he's no military man. He thought he was until the Vamori-Free mission. There's a lot of his grandfather in him.''

''That's where he gets his idealism, Sendi.''

''And lots of your grandfather in you, too.''

''Probably, but it's the other side of him that's my genetic inheritance, I think.'' Vaivan suddenly looked intensely at me with those beautiful dark eyes of hers. ''And you're the mirror image of my grandfather.''

''I don't agree.''

''It doesn't make any difference whether you do or not. You are who you are. We'll need the mirror image of The General now that we're in a new game.''

''Don't you think we should wait to see what history has to say?''

Vaivan managed to shake her head in spite of her throat. ''Sendi, you know history, but General Vamori *understands* it. If I may quote our prophet, 'History doesn't repeat itself; historians merely repeat each other.' ''

''You may be right.'' It was a phrase I used when I didn't want to argue, pending a further study. ''But, Vaivan, you used the word 'prophet.' This part of the world has produced some of the world's leaders, but no prophets. Isn't it rather ironic it produced General Anegam Vamori?''

Vaivan smiled. It was a strained smile, and I knew it bothered her, although acu-blocks were eliminating pain. ''To repeat what our prophet says about that, 'The times encourage the man of the times to change the times.' ''

''Who's going to write the holy book?'' I asked.

''What holy book?''

''Well, if history is a guide, somebody will write down the sayings of The

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General as the prophet of plenty, and it will become dogma for the new religion."

"Sendi, all we have to do is take the words of other prophets and synthesize them."

"How else did all the other holy books of the world come to be?"

Vaivan was quiet for a moment, then asked, "When are you going to start writing it?"

"That's up to someone else. There are other things for me to do."

"Are you so sure? Military men usually write their memoirs. What are those other than history? You told The General you think you'd be a better historian. Perhaps you're the one who should document this year of 2050 A.D. in the Commonwealth."

"I might, but not for that reason. We've got to continue to prevent Space War Two. The hell beamers are still there. The mass drivers and catapults didn't play a role this time, but they could throw rocks in future wars. We'll be moving planetoids, and that's the ultimate planet-busting terror weapon. Until The General's philosophy of plenty becomes fully understood and followed, *somebody* will try to twist technology to military use."

"Sendi, you use the word 'military' as an evil qualifier, a word with negative semantic charge. It doesn't have to be."

That had bothered me for years. It had been a paradox that haunted my professional life. Tsaya with her scientific outlook wouldn't understand it, but Vaivan might because she had a working knowledge of the real world. So I unloaded on her. "We need technology desperately, but how can we keep it from being used for military conquest? *How?*"

"I don't know why it bothers you," she replied without hesitation. "We've managed to do it. You do it yourself, Sendi. One of the principles we're taught came from your first president. We had to learn his words by heart because they form the basis for our modern custom of carrying iklawas: *If we desire to avoid insult we must be ready to repel it; if we desire to secure peace, one of the most powerful institutions of our rising prosperity, it must be known that we are at all times ready for war.*"

"It's different in America today," I observed.

"Not really. America still produces people like you, Sendi. It just lost its momentum, and we were swept into the vacuum that was created. So were you."

"Be that as it may, Vaivan, my job now is to use the knowledge and experience I've got to keep all hell from breaking loose."

"Don't you believe Peter Rutledge feels the same way?"

I nodded.

"We aren't alone."

"But we've got very powerful adversaries. The Tripartite and the other power groups aren't going to go away."

"But they respect us now." She thought a moment, then added, "We've changed the world power balance, and it'll take time for the new system to stop ringing from the change. We'll exploit that because we know it's happening. We'll also exploit the most valuable resource we've got: brainpower. We're the first to know the system's open. And we're the first to make use of it. Sendi,

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it won't be easy, but do you have a better picture of what and why you're here now?''

''Yes.'' I discovered I'd made my own niche by seeing something to be done and doing it. ''But what about you, Vaivan? You've helped me. How can I help you? *Can* I help you?''

''I've spent the long hours of the past day or so thinking about the future. It made it easier for me. We must go on from here, Sendi.''

I'd seen it before: the squaring of the shoulders, the head held proudly high, the announcement of the intention to forge bravely onward in spite of everything while the inner grief gnawed. At least, I thought this was the same. That's why when Vaivan put out her bandaged hand to me, I took it even though I abhor the feeling of synflesh.

''And if you mean to provide solace and sympathy to the widow of a valorous man,'' she told me levelly, ''don't neglect the fact that our family ties are very strong. Every member of my family has been to see me to share grief. But in spite of the fact that you're 'family' now, I think you came for other reasons, Sendi.''

I said nothing. I couldn't.

The beauty of this incredible woman was more than what was hidden by surgical dressings and synflesh coverings, and it radiated from her as she went on, ''You're the product of a puritanical culture, Sendi. Americans are frustrated romantics because of it. On the other hand, we're logical people trapped in a romantic culture. All peoples have their problems.''

Her radiance was too much for me. I couldn't contain myself, so I blurted out, ''Dammit, I'm a newly and happily married man with a lovely, beautiful, talented wife! But I've also been deeply in love with you, Vaivan, since the first moment I saw you! And I've grown to love you more and more as I've gotten to know you. I held back because you were a married woman. Now I've got to continue to hold back because I'm the married one. But I had to tell you. I wanted to tell you but I couldn't. I was afraid to tell you, and I forced myself to come here today on the pretext of duty.''

''Oh, I'm glad you did, Sendi. It's been a time of war, and we haven't had time to talk of love although there were times when I worried about you and wanted you safe with me because I found myself in love with you, too.''

I got up. ''I'd better go now. . . .''

I was at the edge of the porch before she called out to me, ''Sendi, you're being provincial.''

I turned to face her. I didn't say anything. I couldn't.

''My dearest Sendi,'' she went on, ''we're a free people with a philosophy of abundance. A free person's morality is based on what's right without harming others. What do *you* think is right for you, for Tsaya, and for me?''

''I don't know.''

''Let me see if I can help. Tsaya told you to come and knows you're here, correct?''

''Yes.''

''And all three of us realize we live in a world that has plenty of everything for everyone, correct?''

''I'm not sure I can grasp all of the implications of The General's philoso-

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phy yet, especially when it's applied to a human relationship like love."

"It's close to Muslim beliefs concerning the relationships between men and women, including chivalry and its derivative, romantic love, but without the limits imposed by philosophy of scarcity. If a person can be a satisfying mate to more than one person, why should love be limited? This is a world of abundance, Sendi, and that includes love."

Vaivan held out both her bandaged hands to me. "Sendi Boldwon, Tsaya and I know you're capable of providing unlimited love and respect. Something may still be rare, but it no longer has to be scarce, *moapa*."

I should end these memoirs as they began: in Topawa with flags flying, soldiers marching in the streets, and shops and schools closed. A year from the day I set foot in the United Mitanni Commonwealth, it was again a holiday, but things had changed. Oh, how they'd changed! We'd survived our first great challenge. And I'd changed as well.

Celebrations, holidays, and other social functions are the glue that holds people together in their social institutions. I used to dislike ceremonies and celebrations until I went through the culture shock of the Commonwealth. Now their meanings are more clear to me. The Sunday parade at the Academy in which the cadets march in ancient uniforms and obsolete military formations reminds them and the spectators of the thread of history that's never really broken. Although Christmas and New Years are now almost universally celebrated as altered versions of ancient ceremonial holy days, the Commonwealth celebrates them for new reasons.

But I wasn't in the Commonwealth that day to be part of the celebration there. I insisted on participating in a special celebration. We unveiled a plaque of Kulala gold on the outside of the Commonwealth L-5 module so that it faced the entire Universe:

ASTRABAD
named for
OMER KOLIL ASTRABADI
2025 - 2050
in honor of
all those who performed
to their limits
to free the human race
from the bondage of limits.

Trite. Schmaltzy. Melodramatic.

But people's lives everywhere are full of little melodramas when they strive for high ideals, regardless of the cultures they live in. Civilization and humanity progress because people try to better themselves and their children. All great civilizations have depended upon this.

As for myself, I find it impossible to label as "trite" the concepts of freedom—of choice, of trade, of social institution, or of anything else.

Whether we'll make it or not remains to be seen. But we'll try. I think we'll finish the job my forefathers started in 1776.

It's too early yet to tell. ■

● Art is a collaboration between God and the artist, and the less the artist does the better.

Andre Gide

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War and Peace . . .

(continued from page 12)

the first weapons were introduced into space twenty years ago by the United States, which exploded a 1.4-megaton warhead 400 kilometres above Johnson Island (Operation Dominic) on 8 July 1962 to test a possible anti-satellite system. This approach was abandoned when it led to the discovery—only recently *re*discovered, to the consternation of military planners—that a few nuclear blasts in space could disable *all* satellites, simply by the intensity of the radiation pulse.

And not only satellites: when the bomb exploded over Johnson Island, it knocked out street lights and telephones in Hawaii, 1300 kilometres away. Remember, that was twenty years ago; bombs are now bigger and better. A recent study indicates that a single explosion well above the atmosphere could leave an entire continent—the whole of Europe, or the United States—*without power, radio, or telephone communications*. Altogether apart from its strategic implications, this means that there would be no neutrals even in a limited nuclear war (if such a thing is possible). It is something quite new in human history when nations thousands of kilometres from the scene of the conflict could be virtually destroyed in a second *without the loss of a single life*. The dying, of course, would start later, with the collapse of the social structure—even before the arrival of the fall-out . . . . I do not know if this fact is fully appreciated by the non-nuclear powers, who may well question the moral right of others to destroy *them*, even in self-defence.

Though a desperate country might blind and cripple all its enemy's satellites—as well as everyone else's—by a few large nuclear explosions above the atmosphere, this lack of discrimination has led to a search for precision weapons. Since as far back as 1968, the Soviet Union has made more than twenty tests of a non-nuclear anti-satellite destroyer, or ASAT, which hovers near its victim and explodes in a shower of fragments. On 6 and 18 June 1982 (Cosmos 1373, 1379) it tested this satellite system for the first time in conjunction with large-scale ballistic missile launches from silos and submarines.

The interesting question arises—why are the Russians so concerned with developing an ASAT system, with its obvious destabilising implications? One can only assume that the Soviet Union, which is able to obtain a great amount of information about the U.S. military establishment by old-fashioned techniques (such as buying trade magazines on the newsstands) realizes that reconnaissance satellites are much more vital to the Americans than to itself.

Predictably, the United States has not been indifferent to this Russian lead. President Reagan has now announced the development of ASAT systems even more advanced than the Soviet satellite-killers; indeed, they introduce a new dimension into space warfare.

One American weapon will be launched not from the ground, but from a high-flying F-15, so that it jumps up out of the atmosphere to home on a satellite passing overhead. This will make

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it very flexible and extremely difficult to intercept, as it could operate from anywhere on the Earth at very short notice.

Doubtless, scientists in the Soviet Union are attempting to find a counter to this system and so the insane escalation of weapons will continue—unless something is done to check it.

Neither the U.S. nor U.S.S.R. ASAT systems will be operational for some years, so perhaps there is a last chance to prevent the introduction of offensive (as opposed to defensive) systems into space. The importance of halting this arms race before it gets truly underway will be emphasized when one realises that these planned ASATs are only the primitive precursors of systems now being contemplated. For a horrifying description of the next phase of space warfare I refer you to the recently published "High Frontier" study directed by General Daniel O. Graham. This envisages building scores of orbital fortresses to intercept oncoming ICBMs before they could reach their targets. Such a system would cost not billions, but *hundreds* of billions of dollars and of course would be only a stepping stone to something even more expensive.

Which leads us inevitably to the subject of laser and particle-beam weapons. Now that the long-imagined "death-ray" is technically possible, it has been seized upon as a solution to the problem of defence against nuclear missiles. Certainly a precision weapon which releases its energies at a single point and doesn't harm innocent bystanders is a rather attractive proposition.

A vigorous debate is now in progress over the practicability of High Energy Laser weapons, and some scientists believe that, though they can certainly be developed for many close applications, the intercontinental ranges needed for an effective missile defence will be unobtainable for decades—and perhaps forever.

Just look at the problems. There are no secrets involved—merely basic principles of physics. If you want to zap a missile soon after launch you've got to hold your beam to an accuracy of centimetres on a target five thousand kilometres away, moving at several kilometres a second. This demands an optically perfect mirror larger than the Mount Palomar reflector—which required years of skilled labour and millions of dollars to make.

That is just the beginning. In addition, the mirror has to be tough enough to handle five or ten thousand horsepower of pure heat, and light enough to flick from target to target in seconds, with accuracy comparable to tracking a tossed dime, a hundred kilometres away.

And then there's the laser itself. The only known type capable of doing the job would be virtually a rocket motor, burning several *tonnes* of fuel a second—almost in the class of the space shuttle itself. I once saw a small one in action (don't ask me where) and the noise and vibration were awesome. Mounting a precision optical tracking system on such a raging monster would be rather like trying to thread a needle while riding a bucking bronco. And it would require the space shuttle's entire

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payload to carry up enough laser fuel for only two or three shots!

Remember, too, that a *single* fortress would be useless; because of its rapid orbital movement, it could only patrol a small fraction of near-Earth space at one time. You would need at least a score of them, weaving a basket-work around the planet to keep every danger point under continuous surveillance.

It is easy to "prove" that the whole concept is absurd, and a number of scientists have done just that. However, I am always suspicious of negative judgements: some of you may be familiar with Clarke's First Law, partly inspired by the notorious pronouncement made by the chief American defence scientist Dr. Vannevar Bush in 1945:

"There has been a great deal said about a 3,000-mile high-angle rocket . . . I don't think anyone in the world knows how to do such a thing, and I feel confident that it will not be done for a long period of time to come . . . I think we can leave that out of our thinking. I wish the American public would leave that out of their thinking."

That's exactly what the American public did; and so it was "Sputniked" in 1957.

If a thing is theoretically possible, and someone needs it badly enough, it will be achieved eventually, whatever the cost. And when one side develops a new system, the other will try to outdo it.

However, the answer to the laser-carrying orbital fortress—and indeed *any* complex space-weapons system—is so absurdly cheap and simple that it appears ruled out by economics, rather than by technical feasibility. You don't even need chemical explosives to destroy one—still less nuclear weapons. Let me explain.

Assume that there's an unfriendly object in a two-hour orbit—that's about 1,700 kilometres up. To destroy it, you launch your counterweapon into exactly the same orbit—*but in the opposite direction*. And you do it on the other side of the Earth from your target, so you won't be detected.

Your warhead is rather cheap; it's a bucket of nails. However, there's a slight error in your calculations, and you miss by a hundred kilometres. *It doesn't matter*.

Exactly one hour later, going their opposite ways, your slowly expanding cloud of nails encounters the target again, thanks to the inexorable laws of celestial mechanics. Every hour on the hour, your barrage of space shrapnel gets another opportunity; if not today, than tomorrow; if not tomorrow, then next week. Sooner or later, it will do the job. I don't think that anyone really knows what happens when two objects meet at 40,000 kilometres an hour, but it won't be nice. Especially when—as in some scenarios—the target is a tank of laser fuel as big as a jumbo jet, and much more explosive than the *Hindenburg*.

So if Space Power X wanted to bankrupt Space Power Y, it should try to persuade Y that it's developing a system of orbiting fortresses—in the hope that its adversary would do just that, and build a Maginot Line in space that could be destroyed for not even one thousandth of its cost.

Perhaps *this* is what's really going on

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at those mysterious research establishments, like Saryshigan and Semipalatinsk, with which retired generals are continually trying to terrify us. . . .

The two superpowers are led by intelligent and responsible men, yet they sometimes appear like small boys standing in a pool of gasoline—each trying to acquire more matches than the other, when a single one is more than sufficient.

George Bernard Shaw summed up the matter very well in his play *Man and Superman*. As usual, the Devil has the best lines: if you make a few technological updates, you will find his marvellous diatribe in Act III even more appropriate than when it was written, eighty years ago:

> "And is Man any the less destroying himself for all this boasted brain of his? Have you walked up and down the Earth lately? I have; and I have examined Man's wonderful inventions. And I tell you that in the arts of life man invents nothing; but in the arts of death he outdoes Nature herself, and produces by chemistry and machinery all the slaughter of plague, pestilence and famine. . . . When he goes out to slay, he carries a marvel of mechanism that lets loose at the touch of a finger all the hidden molecular energies, and leaves the javelin, the arrow, the blowpipe of his fathers far behind. In the arts of peace Man is a bungler. . . . I know his clumsy typewriters and bungling locomotives and tedious bicycles; they are toys compared to the Maxim gun, the submarine torpedo boat. There is nothing in Man's industrial machinery but his greed and sloth; his heart is in his weapons."

His heart is in his weapons. That is indeed a chilling indictment, and it is applicable not only to men but to nations; they can share the same pathologies. I once coined the deliberately provocative slogan: GUNS ARE THE CRUTCHES OF THE IMPOTENT. So are Intercontinental Ballistic Missiles.

It is no longer true that wars begin in the minds of men; they can now start in the circuits of computers. Yet the technologies which could destroy us can also be used for our salvation. From their very nature, space systems are uniquely adapted to provide global facilities, equally beneficial to all nations.

As is now widely known, in 1978 the French Government proposed the establishment of an International Satellite Monitoring Agency to help enforce peace treaties and to monitor military activities. This has been the subject of a detailed study by a UN committee, which concluded that such a system could well play a major role in the preservation of peace.

The operational political difficulties are obviously very great, yet they are trivial when compared with the possible advantages. The expense—one or two billion dollars—is also hardly a valid objection. It has been estimated that its reconnaissance satellites saved the United States the best part of a *trillion* dollars. A global system might be an even better

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investment; and who can set a cash value on the price of peace?

However, the United States and the Soviet Union, anxious to preserve their joint monopoly of reconnaissance satellites, are strongly opposed to such a scheme. The British government is also lukewarm, to say the least. Nevertheless, we have seen that in matters of great—though lesser—importance, such as international communications, it is possible to have extremely effective co-operation among a hundred or more countries, even with violently opposing ideologies. INTELSAT is a prime example, as on a smaller scale is INTERSPUTNIK; and in the near future ARABSAT will establish its regional space system.

I like the name PEACESAT, and although it has already been pre-empted by the Pacific Radio Network's ATS 1, I will use the term, with due acknowledgement, for the remainder of this talk.

Reactions at Unispace '82 and elsewhere suggest that the PEACESAT is an idea whose time has come. Those who are sceptical about its practicability should realise that most of its elements are present, at least in rudimentary form, in existing or planned systems. The French SPOT satellite, with a ground resolution of ten-twenty metres, has already been mentioned. Whether the superpowers wish it or not, the facilities of an embryo PEACESAT system will very soon be available to all countries.

May I remind my Russian and American friends that it is wise to co-operate with the inevitable; and wiser still to *exploit* the inevitable. When I visited the Institute of Space Science in Moscow last June, I made a point of stressing the French proposal, and teased my hosts by suggesting that, as both the U.S. and the U.S.S.R. were against it, it was probably a good idea. Someone then made the cynical remark: "Perhaps the French hope to sell the necessary equipment." I'm sorry I didn't think of the right retort in time: "So what?"

PEACESATs could develop in a non-controversial manner out of what Howard Kurtz, their long-time advocate, has called the Global Information Co-operative. This could be a consortium of agencies for weather, mapping, search and rescue, resources and pollution monitoring, disaster watch, information retrieval and, of course, communications. No one denies the need for these facilities. If they were provided globally, they would inevitably do much of the work of a PEACESAT system. The only extra element required would be the evaluation and intelligence teams needed to analyse the information obtained.

Since I wrote these words, I am happy to say that the Russian Search and Rescue satellite COSPAS has saved a dozen American and Canadian lives, by detecting the faint radio signals from downed aircraft and wrecked ships (five within two months!). This is just the beginning of a system which we will soon take completely for granted, as we have done ever since the *Titanic* sent out its first distress call seventy years ago.

The organisation, financing, and operation of a PEACESAT system has been discussed in the UN report, to

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which I refer you for details. It is not a magic solution to *all* the problems of peace: there is no such thing. But at least it is worthy of serious consideration, as one way of escape from our present predicament—all of us standing in that pool of gasoline, making our Mutual Assured Destruction ever more assured.

I would like to end as I began, with the conclusion of my 1946 essay, "The Rocket and the Future of Warfare."

"The only defence against the weapons of the future is to prevent them ever being used. In other words, the problem is political and not military at all. A country's armed forces can no longer defend it; the most they can promise is the destruction of the attacker. . . .

"Upon us, the heirs to all the past and the trustees of a future which our folly can slay before its birth, lies a responsibility no other age has ever known. If we fail in our generation, those who come after us may be too few to rebuild the world, when the dust of the cities has descended, and the radiation of the rocks has died away." ■

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•Program: Any assignment that cannot be completed with one telephone call.
•Status quo: The mess we're in.
•"Under consideration": We never heard of it.
•"Under active consideration": We're searching the files for it.

Kelvin Throop III

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ON GAMING

Dana Lombardy

This month's column completes the descriptions of the two-score SF and fantasy games that have won adventure gaming awards from 1978-1982.

Game Designers' Workshop (Box 1646, Bloomington, IL 61701) has won nine awards for its SF game designs, more than any other company. Eight are still available.

Almost all the items are related to *Traveller*®, which is GDW's best-known product and the most popular SF role-playing game to date.

Traveller® is set in a future interstellar society. Its rules provide the framework for how encounters, battles, negotiations, etc., are to be conducted and resolved, all overseen by a referee who first questions the players and then, while consulting various tables and charts, rolls dice to determine the outcome of the action.

The game comes in four editions: *Basic Traveller*®, which consists of three rules books—*Characters and Combat, Starships,* and *Worlds and Adventures: Deluxe Traveller*®, which consists of the same books, plus map, dice, introductory adventures, and an introduction for novices; the hardcover *Traveller*® *Book* with rules and adventures in one volume; and the new *Starter Traveller*® with streamlined rules, dice, and introductory adventures.

These adventures are the key reason the game has proven so popular. A good adventure basically is a good story. But instead of merely reading it, the players get to fill in the plot as they play.

Two of the *Traveller*® adventures have themselves won awards. *The Kinunir* is *Traveller*® Adventure Book 1. Its forty-four pages present four alternate scenarios: 1) getting hired as industrial spies to find out certain things about the old *Kinunir*-class battle cruiser; 2) accompanying a foppish young noble on a hunting trip to a restricted planet; 3) rescuing a senator from a converted cruiser now being used as a prison ship; and 4) locating the lost *Kinunir* (namesake for this class of ships) and discovering why it disappeared without a trace.

Twilight's Peak is *Traveller*® Adventure Book 3. This sixty-four-page adventure is a search for the remains of a military expedition lost on a mission a century before. The referee uses planet and space subsector maps to guide the adventure, and descriptions of aliens and animals also are included.

Mayday, Traveller® Game 1, is a board game that can be played by itself or used in conjunction with *Traveller*® when ship-to-ship combat is called for.

The game comes in a small-format box with four small astromorphic maps; a six-sided die; and 120 die-cut playing pieces representing large and small starships, smaller craft such as lifeboats and orbital shuttles, missiles, explosions, planets, and reference counters.

The fifteen-page rules booklet includes senarios ranging from "The Grand Prix" race to "Smuggling."

Azhanti High Lightning is *Traveller*® Game 3. Like *Mayday*, this is a board game that can be played by itself or in conjunction with *Traveller*®.

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AHL is a game of close-action combat between individuals on board a large military starship. This impressive boxed game includes fourteen large ship deck plans in color; two six-sided dice; 240 die-cut cardboard playing pieces representing characters, animals, and robots; a combat chart; a forty-three-page technical manual describing the *Lightning*-class starships; and a forty-four-page rules book with adventure scenarios.

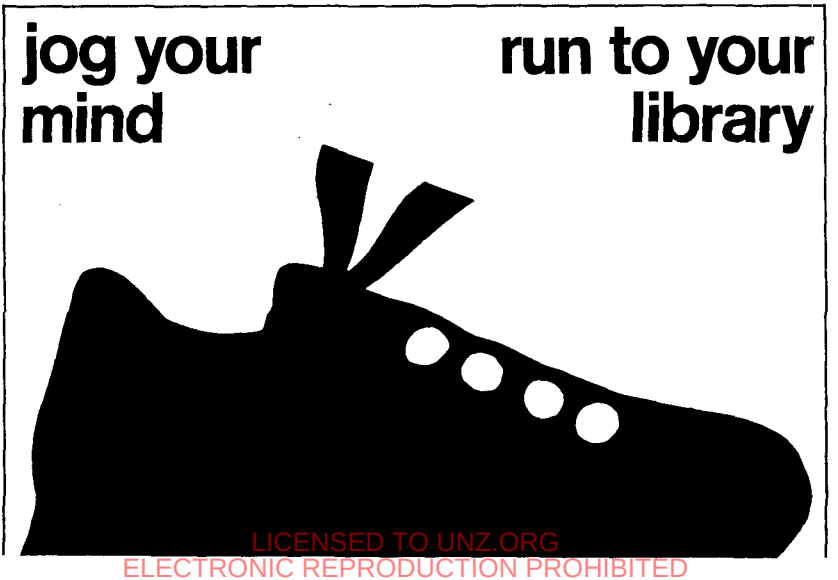
Two other award-winning GDW games not associated with *Traveller*® are still in print. *Imperium,* subtitled "Empires in Conflict, Worlds in the Balance," attempts to simulate the course of several interstellar wars occurring over a century or more. A single game involves a single war and can be played in one evening. The campaign to conquer the entire star map may take many games over several weeks of play.

Imperium has a four-color map showing the stellar area of Sol; a six-sided die; two combat tables and reference charts; a twelve-page rules folder; and 352 large die-cut cardboard counters representing starships, troops, planetary defenses, possession, and bookkeeping markers.

Double Star portrays interplanetary warfare within a binary star system. Each player controls an entire culture —one based in the superior yellow star system, the other in the poorer red dwarf system. The game map shows these systems, including the orbital paths of the planets, and smaller surface maps of each planet.

Also included is a six-sided die; two charts and combat tables cards; six pages of rules and scenarios; and 480 die-cut counters representing ships, population, bases, planetary defenses, industry, and the worlds and planetoids of the two star systems. ■

Editor's Note: "On Gaming" readers and product manufacturers who wish to contact Dana Lombardy may address mail to: 8418 McKenzie Circle, Manassas, Virginia 22110.



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brass tacks

Dear *Analog* Editors:

One thing that bothered me while I was compiling my AnLab responses — there are a few (three or four) authors who seem to appear in *Analog* with very high regularity (Timothy Zahn and Joseph Delaney come to mind offhand). I'm not saying that these authors don't provide quality fiction, but this gives the appearance of *Analog* having only a fairly limited "camp" of authors who you draw your material from, with only the occasional "superstar" or new writer being published in your pages. Besides limiting the diversity of material published, this also might be intimidating some new writers away from submitting material that might well be worth reading ("Oh, my story'll never get into *Analog*. I'm not one of their regulars.").

Finally, I'd like to praise you for your intelligent editorials, reviews, and especially the *excellent* Alternate View columns. I can't say I unconditionally agree with everything printed in those pages, but they have given my intellectually inclined friends and me a bounty of food for thought and debate on such issues as space R&D, national defense, new technological advances, and so on. Keep up the good work.

I've been an *Analog* subscriber for a year and a half now, and I hope to continue to be for quite a while in the future. Thanks.

CATHY STANTON

Greenville, NC

Thanks for the opportunity to reiterate that we do not by any means shun new writers or restrict ourselves to a group of "regulars." I buy stories solely on the basis of their content, but sometimes a writer turns out to be an unusually prolific source of the kinds of stories our readers like best, and so they appear here often. As a relatively new member of the Analog *family you couldn't*

OMISSION

"Technolorata," which appeared on page 91 of the June issue, mistakenly was printed without acknowledgment. Our apologies to the author, Arlan Keith Andrews, Sr.

—The Editor

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know it, but your examples are actually rather ironic. Both Timothy Zahn and Joseph H. Delaney started here as complete unknowns quite recently—in fact, Joe's three stories in 1982 were his first three ever! (But not, by any means, his last.)

Dear Stan:

In Harry Stine's "The Alternate View" for September 1982 he concludes that the origin of intelligent life on Earth probably had some "guidance" from extraterrestrial sources. The reason he comes to this conclusion is the staggeringly small probability that life and/or intelligence could have evolved "by random chance." Harry's not alone in falling for this conundrum: Hoyle, Crick, and others have also looked at the statistics and concluded that a deus ex machina of some sort is required to explain how we got here.

Yet they are all overlooking the work of two chemists, done in the 1950s, which shows that the "statistics problem" is not as severe as many people seem to think.

The first chemist is Dr. Melvin Calvin, Nobel Laureate, who showed that simple organic molecules tend to "autocatalyze" themselves toward more and more complex molecular structures. Thus the original chemical compounds available to the earliest oceans of Earth were able to build themselves up to self-replicating nucleic acids: i.e., life.

The second chemist is Dr. Isaac Asimov. Although he does not yet have a Nobel Prize, his writing should be more familiar to Hoyle, Stine, et al., since much of it appeared in *ASF*. In particular, I refer to "The Unblind Workings of Chance," in which Isaac pointed out rather neatly that chemicals do not combine randomly at all. As anyone who has suffered through high-school chemistry should remember, the chemical elements are rather fussy about how they combine with one another. Valences and all that sort of thing.

It does not seem necessary, then, to postulate extraterrestrial assistance in the appearance of life and intelligence on Earth. Indeed, doing so merely begs the question. If life did not arise spontaneously here, how did it arise in the place where it *did* originate? The "extraterrestrial argument" leads us nowhere. We are faced with a choice of trying to determine how life arose on Earth, or accepting the religious tenet that God had no beginning. Or both.

BEN BOVA

New York, NY

Dear Dr. Schmidt:

I found your editorial on "lost inventions" (October 1982) very interesting.

"Everyone knows" that the pace of technological change has been accelerating. (Define technological change and measure its acceleration?)

If everyone knows it, it is almost certainly false. Listen to historian John Lukacs: "Fifty years ago, our fathers and grandfathers were beginning to live substantially the way we live now. Between 1870 and 1920, the daily lives of people in the cities of the Western world changed more than they changed ever before, or after."

That sounds like Lukacs sees the pace of change accelerating after the American Civil War and the wars of German and Italian Unification; and *slacking off* after World War I.

How to do the measurement? Let's take the number of U.S. patents issued for inventions. This series (W99) is complete to 1790. Normalized for total U.S. resident population, the series looks exactly like a logistic growth

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curve. It had a population explosion (idea explosion?) in the decades after the Civil War and stabilized after the first world war. Since then, it has cycled around this stability point.

Please note: things are still changing. And at a high *velocity;* but the rate of change is no longer *accelerating.*

Prediction: Messrs. Stine and/or Pournelle, if told of this, will first object that U.S. patents issued is not *per se* a measure of technological change. After all, a company might conceal an invention, not make it patent. On second thought, however, is not the concealing of knowledge, whether for economic protection or national defense, precisely what inhibits change?

Here's a thought for SF people: Resolved: All great change in modern life originated between 1870 and 1939. All changes since then have either been extensions of previous inventions or have had their roots in that period.

An astrophysicist friend of mine immediately cried "Transistors in the 1950s!"

Wrong. Lilienfeld patented what was essentially a transistor on 28 Jan 1930. (See Ted Thomas's article, "The 20 Lost Years of Solid State Physics," *Analog,* March 1965).

Television? Actually an extension of radio; nevertheless, Zworykin had one working in 1929 and a multi-channel TV was on display at the 1939 World's Fair. (By the way, compare the predictions of everyday future life of 1939's "World of Tomorrow" and 1964's "Olympics of Progress").

Hmm. Let's see. Nuclear power? Einstein, 1905. The first pile at Chicago, 1939. (And the first rearrangement of a nucleus by bombardment was in *1919!*)

Solar power! Now that's today. Sorry. As the enclosed shows, a solar-powered printing press was exhibited in Paris in 1882 and solar-power pumping stations were used in desert areas until WWI. (Our great-grandfathers used solar energy to create steam power; we are trying to use it to create electrical power. Different strokes for different folks.)

I had granted my friend lasers and holography as being truly "modern" inventions. Now, you have pushed the roots of holography back into the Creative Epoch.

Interesting to think we may be living off the creative capital accumulated a century ago!

MICHAEL F. FLYNN

Golden, CO

Dear Ms. Mitchell:

I am addressing this to you at the suggestion of C.M. Fitchett, who has had previous correspondence with you. As you may know, I have been giving her science advice on the story she is working on called "The Observer Effect."

I have also been doing some preliminary work on another project we have in mind, and that led to my developing a computer program which predicts the behavior of any number of bodies under their mutual gravitation attraction. I am writing to offer that program to any of your authors who might have use for it, at no charge. All I ask is that they enclose a self-addressed legal-size envelope with 60¢ of stamps attached (or if outside the U.S., International Reply Coupons).

The program prompts the user for seven quantities for each body: the three values of its initial position and the three values of its initial velocity, plus the bodies' mass. It also requests the time interval over which the individual extrapolations should be made.

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Output of the program is a list of each body's position as a function of time. (I have also developed a plot program to show the results in pictorial form, but that requires some specialized equipment.)

The program is written in FLECS, which is a super-set of FORTRAN. A straight FORTRAN version is also available. The program is annotated so that it should be readily understood, and takes in the neighborhood of 300 lines of code.

For any exotic applications where the program as is isn't good enough, or for running the program on my equipment for those who have no access to computers, I am available to consult with users.

Now, I am not advocating this program as one which could reliably reveal the forty seconds per century precession of Mercury, but it does perform far better than any other extrapolation-type program I have run across before. Closed orbits remain closed, to ten 9's per revolution; unperturbed orbits are always conic sections, and singly perturbed orbits switch from one conic to another.

So how about it? Is orbital mechanics too old hat for Sci-Fi these days, or are there stories out there just aching to be written, but which require some exotica in the way of Keplerian motion? Try it, you'll like it.

W.M. CAREY

58 Algonquin Trail
Medford Lakes, NJ 08055

Most stories involve orbital mechanics either implicitly or explicitly, whether exotic or otherwise. And some of the exotic possibilities are surely good for stories!

Sir:

You are devoting too much space to poorly supported, almost fraudulent alarmist articles. John Gribbin's last one on the nuclear testing on weather was especially bad.

First, Mr. Gribbin ignores NO_x produced by natural processes, such as lightning. *Encyclopaedia Britannica* tells us that in 1960 rain washed 9×10^7 tons of HNO_3 out of the atmosphere. No one knows how much was left in the atmosphere, but even if 10% of the precipitated amount found its way into the stratosphere, it would easily swamp the 1.5×10^6 tons of NO_x produced in the whole nuclear testing history.

Second, he contradicts elementary chemical kinetics in judging the effect of NO_x catalysis on ozone layer depletion. Ozone did not appear there by an act of Providence; it was generated by ultraviolet rays splitting 0_2 molecules into atoms. Some of these reacted to form 0_3, and thus the ozone layer was born. If the ozone concentration in the layer is depleted by NO_x catalysis of its decomposition, ultraviolet rays will penetrate beyond it, but there they will strike 0_2 molecules and generate more ozone below the original layer until all the active radiation is absorbed.

Thus the ozone layer can't be destroyed. Increasing the breakdown rate of ozone will dilute the layer, but will also increase its thickness, so the total atmospheric ultraviolet light absorption will remain the same. Problems will arise only if the lower edge of the ozone layer reaches the earth surface, but we are a long way from that.

ANDREJS BAIDINS

Wilmington, DE

John Gribbin replies:

First, lightning operates in the troposphere, the weather layer of the atmosphere nearest to the ground, where extraneous material is washed downwards by rain. Little of the NO_x produced in this way reaches the

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stratosphere, because the stratosphere is a warming layer (temperature increases with height) in which convection is suppressed. So the amount of nitrogen oxides produced naturally in the troposphere is no guide to the natural balance in the stratosphere, the ozone layer. Concern about bomb products centres on the fact that a rising nuclear fireball breaks through the boundary between troposphere and stratosphere, and injects those products at high altitudes in the ozone layer, where they can do most harm.

Secondly, the whole point of the process described by the Russian team is that a pulse of NO_x injected from the fireball of a nuclear explosion produces a short-lived *disturbance of the natural ozone balance. The best analogy for the dynamics of the ozone layer is a leaky bucket, with several holes, being filled by several taps running at different rates. In the long term, the level of water is stable even though it is constantly running out and being replenished. But if you throw an extra bucket of water in the top suddenly, it takes some time for normal status to be restored. The bomb NO_x is like that extra bucket of water upsetting the balance. The question is how big an effect that disturbance has, and how long it lasts. There is nothing alarmist in looking at the possible implications.*

Dear Mr. Schmidt:

There is reference to "High Frontier" in your December issue of *Analog*. What is this purely defensive orbital station and how can I learn more about it? It is appealing to think on a device that could make our nation safe from attack and not be in itself a threat to anyone. Please, TELL ALL! I have not run across any other account of this device.

DAVID H. HANNAH
919 N. 19th #23
Colorado Springs, CO 80204

P.S. I live in sight of the entrance to NORAD, almost in sight of Peterson Field (AF) and Fort Carson, a few miles south of the Air Force Academy, about 25 miles from the future home of the military version of Houston Control and surrounded by the nation's most imposing facilities for producing memory chips. At this writing the president has proposed Dense Pack for the MX at a point about 200 miles north of here. The Russian military has demonstrated less than accuracy in their missile firings. I love these mountains but there seems to be no part of them that could be thought of as "safe." I have a vested interest in seeing a truly defensive device stressed.

High Frontier is not as simple as a single orbital station; it's a whole plan of defense and a multi-element system for implementing it. Jerry Pournelle has said a few things about it in his columns, and the original, basic High Frontier report is available for $15 from Project High Frontier, 1010 Vermont Ave. NW Suite 1000, Washington, DC 20005. ■

● The break in the sawtooth pattern of catastrophe and recovery may finally come about through the establishment of contact with a more advanced society—one that has already achieved stability.

Fred Hoyle

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a calendar of analog upcoming events

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162nd Annual Meeting of the American Astronomical Society at Minneapolis, Minn. Info: Executive Offices, AAS, 1816 Jefferson Pl. NW, Washington DC 20036. 202-659-0134.

19-23 June
Computer Vision and Pattern Recognition conference at Washington, D.C. Info: CVPR 83, Box 639, Silver Spring MD 20901. 301-589-3386.

1-4 July
WESTERCHRON 36 (36th West-Coast SF conference) at Red Lion Inn, San Jose, Calif. Guest of Honor—Phil Klass; Artist Guest of Honor—Alicia Austin; Fan Guest of Honor—Tom Whitmore; TM—Damon Knight. Info: Westerchron 36, 2000 Center Street #1051, Berkeley CA 94704.

1-3 July
INCONJUNCTION III (Indiana SF conference) at Airport Hilton Inn, Indianapolis, Ind. Fantasy Guests of Honor—L. Sprague and Catherine Crook de Camp; SF Guest of Honor—Gordon Dickson; Fan Guests of Honor—B.J. and Beth Willinger; TM—Buck Coulson. Info: InConJunction III, Box 24403, Indianapolis In 46224.

8-10 July
ARCHON 7, Chase Park Plaza Hotel, St. Louis. Guest of Honor—Gene Wolfe; TM—Howard Waldrop. Info: Archon 7, P.O. Box 15852, Overland MO 63114.

15-17 July
OKON 83/FILKON EAST (SF conference) at Excelsior Hotel, Tulsa, Okla. Guests of Honor—Larry Niven and Jerry Pournelle; Artist Guests of Honor—Dell Harris and Real Musgrave; Fan Guest of Honor—Marty Burke; Filkon East Special Guest—Bob Maraschiello. Info: OKON, Box 4229, Tulsa OK 74104 (include S.A.S.E.).

15-17 July
MAPLECON 5 (Ottawa SF and comic book conference) at Carleton University, Ottawa, Ont. Programming, films, gaming, dealers, art, comics, video, etc. Info: Maplecon 5, Box 3156, Station D, Ottawa, Ontario, Canada K1P 6H7. 613-746-5191.

16-17 July
SPACE ATLANTA '83 (Pro-space SF-related conference) at Georgia State University's Urban Life Conference Center. Info: Calvin Bobbitt, SPACEWEEK-ATLANTA, 2947 Main Street #4, East Point GA 30344.

1-5 September
CONSTELLATION (41st World Science Fiction Convention) at Baltimore Convention Center, Baltimore, Md. Guest of Honor—John Brunner; Fan Guest of Honor—Dave Kyle; TM—Jack Chalker. Registration—$15 supporting at all times. Attending—$40 until 1 July 1983, more at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: ConStellation, 41st World Science Fiction Convention, Box 1046, Baltimore MD 21203.

—Anthony Lewis

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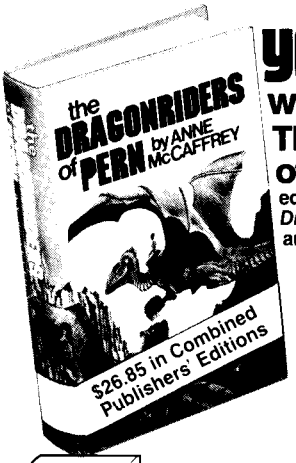

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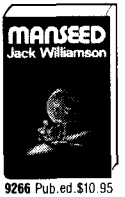

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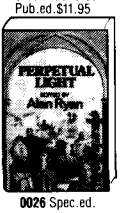

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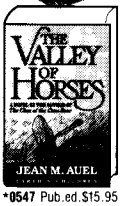

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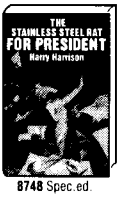

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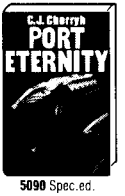

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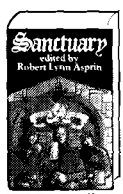

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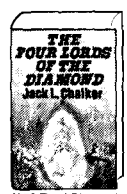

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